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TECHNICAL MEMORANDA

SUMMARY
SITE INVESTIGATION AND REMEDIATION REPORT
AIRPORT/KLONDIKE AREA
AT
PRATT & WHITNEY
EAST HARTFORD, CONNECTICUT
EPA ID No. CTD990672081

Prepared for:

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LEA Comm. No. 68V8124

SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES BY DATE

Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extractions	Miscellaneous
NK-MW-01	CAS 1030790	03/07/90	7.00	12.00	GW		x							
NK-MW-02	CAS 4030790	03/07/90	5.00	10.00	GW		x							
NK-MW-03	CAS 7030790	03/07/90	7.0	12.0	GW		X							
NK-MW-04	CAS 8030790	03/07/90	7.00	12.00	GW		x							
NK-MW-05	CAS 3030790	03/07/90	4.00	9.00	GW		x							
SA-MW-01	CAS 2030790	03/07/90	13.00	18.00	GW		x							
SA-MW-02I	CAS11030790	03/07/90	15.00	25.00	GW		X							
SK-MW-06	CAS 6030790	03/07/90	7.00	12.00	GW		x							
SK-MW-07	CAS 9030790	03/07/90	8.00	13.00	GW		x							
SK-MW-07	CAS12030790	03/07/90	8.0	13.0	GW		x							
SK-MW-08S	CAS10A30790	03/07/90	7.50	12.50	GW		x							
SK-MW-01	CW1900309	03/09/90	8.00	13.00	GW		x	x						
SK-MW-02	CW3900309	03/09/90	9.00	19.00	GW		x	x						
SK-MW-03	CW4900309	03/09/90	6.00	16.00	GW		x	x						
SK-MW-04	CW5900309	03/09/90	5.60	15.60	GW		x	x						
NK-MW-01	31390090550	09/05/90	7.00	12.00	GW		x	x						X
NK-MW-02	31390090553	09/05/90	5.0	10.0	GW		x	x						X
NK-MW-03	31390090556	09/05/90	7.0	12.0	GW		X	x						X
NK-MW-04	31390090557	09/05/90	7.0	12.0	GW		x	x						X
NK-MW-05	31390090552	09/05/90	4.0	9.0	GW		x	x						X
SA-MW-01	31390090551	09/05/90	13.00	18.00	GW		x	x						X
SA-MW-02I	31390090561	09/05/90	15.00	25.00	GW		X	x						X
SK-MW-05	31390090554	09/05/90	6.00	11.00	GW		X	x						X
SK-MW-06	31390090555	09/05/90	7.00	12.00	GW		x	x						X
SK-MW-07	31390090558	09/05/90	8.00	13.00	GW		X	x						X
SK-MW-08D	31390090560	09/05/90	49.00	59.00	GW		x	x						X
SK-MW-08S	31390090559	09/05/90	7.50	12.50	GW		x	x						X
NK-MW-02	31390112028	11/20/90	5.0	10.0	GW		X	x				X		X
NK-MW-03	31390112031	11/20/90	7.0	12.0	GW		X	x						X
NK-MW-04	31390112032	11/20/90	7.0	12.0	GW		X	x						X
NK-MW-05	31390112027	11/20/90	4.0	9.0	GW		x	x						X
SA-MW-01	31390112026	11/20/90	13.00	18.00	GW		X	x				x		X
SK-MW-05	31390112029	11/20/90	6.00	11.00	GW		X	x				X		X
SK-MW-06	31390112030	11/20/90	7.00	12.00	GW		x	x						X
SK-MW-07	31390112033	11/20/90	8.00	13.00	GW		X	x				X		X
SK-MW-08D	31390112035	11/20/90	49.00	59.00	GW		X	x						X
SK-MW-08S	31390112034	11/20/90	7.50	12.50	GW		x	x						X
SA-MW-02I	31390112144	11/21/90	15.00	25.00	GW		X	x						X
NK-MW-02	31391022204	02/22/91	5.0	10.0	GW		x					X		X
NK-MW-03	31391022207	02/22/91	7.0	12.0	GW		X							X

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Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

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NK-MW-04	31391022208	02/22/91	7.0	12.0	GW		x							X
NK-MW-05	31391022203	02/22/91	4.0	9.0	GW		x							X
SA-MW-01	31391022202	02/22/91	13.00	18.00	GW		X					X		X
SA-MW-02I	31391022212	02/22/91	15.00	25.00	GW		X							X
SK-MW-05	31391022205	02/22/91	6.00	11.00	GW		X					X		X
SK-MW-06	31391022206	02/22/91	7.00	12.00	GW		x							X
SK-MW-07	31391022209	02/22/91	8.00	13.00	GW		X					X		X
SK-MW-08D	31391022211	02/22/91	49.00	59.00	GW		x							X
SK-MW-08S	31391022210	02/22/91	7.50	12.50	GW		x							X
NK-MW-03	30291052901	05/29/91	7.0	12.0	GW		X							X
NK-MW-04	30291052902	05/29/91	7.0	12.0	GW		X							X
SK-MW-05	30291052903	05/29/91	6.00	11.00	GW		X					X		X
NK-MW-03	01031111391	11/14/91	7.0	12.0	GW		X					X		
NK-MW-04	01041111391	11/14/91	7.0	12.0	GW	x						X		
NK-MW-06	01061111391	11/14/91	4.0	11.5	GW	x						X		
NK-MW-07	01071111391	11/14/91	5.0	12.5	GW	x						X		
SK-MW-09	02091111391	11/14/91	5.00	15.00	GW	x						X		
SK-MW-10	02101111391	11/14/91	5.00	15.00	GW	x						X		
SK-MW-11	02111111391	11/14/91	5.00	15.00	GW	X						X		
SK-MW-12	02121111391	11/14/91	4.50	14.50	GW	X						X		
SK-MW-13	01131111391	11/14/91	2.60	12.60	GW	x						X		
NA-MW-01	03011111491	11/15/91	5.3	15.3	GW	x						X		
NA-MW-02	03021111491	11/15/91	4.8	14.8	GW	x						X		
NA-MW-03	03031111491	11/15/91	4.5	14.5	GW	x						X		
NA-MW-04	03041111491	11/15/91	10.3	20.3	GW	x						X		
SA-MW-03	04031111491	11/15/91	10.00	20.00	GW	x						X		
SA-MW-04	04041111491	11/15/91	7.50	17.50	GW	x						X		
SA-MW-05I	04052111491	11/15/91	13.50	23.50	GW	X						X		
SA-MW-05S	04051111491	11/15/91	4.50	14.50	GW	x						X		
SK-MW-05	02051111491	11/15/91	6.0	11.0	GW	X						X		
NA-MW-01	03011060992	06/10/92	5.3	15.3	GW	x						X		
NA-MW-02	03021060992	06/10/92	4.8	14.8	GW	x						X		
NA-MW-03	03031060992	06/10/92	4.5	14.5	GW	X						X		
NA-MW-04	03041060992	06/10/92	10.3	20.3	GW	X						X		
NK-MW-03	01031060992	06/10/92	7.0	12.0	GW	X						X		
NK-MW-04	01041060992	06/10/92	7.0	12.0	GW	x						X		
NK-MW-06	01061060992	06/10/92	4.0	11.5	GW	x						X		
NK-MW-07	01071060992	06/10/92	5.0	12.5	GW	x						X		
SA-MW-03	04031060992	06/10/92	10.00	20.00	GW	x						X		
SA-MW-04	04041060992	06/10/92	7.50	17.50	GW	x						X		

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SA-MW-05	04051060992	06/10/92			GW	X						X		
SA-MW-05	04052060992	06/10/92			GW	x						X		
SK-MW-05	02051060992	06/10/92	6.0	11.0	GW	X						X		
SK-MW-09	02091060992	06/10/92	5.00	15.00	GW	X						X		
SK-MW-10	02101060992	06/10/92	5.00	15.00	GW	x						X		
SK-MW-11	02111061092	06/11/92	5.00	15.00	GW	X						X		
SK-MW-12	02121061092	06/11/92	4.50	14.50	GW	X						X		
SK-MW-13	02131061092	06/11/92	2.60	12.60	GW	x						X		
NK-MW-08	01081101392	10/13/92	4.0	11.0	GW		x	x			x	x		
NK-MW-09	01091101392	10/13/92	4.0	11.0	GW		x	x			x	x		
NK-MW-09	13011101392	10/13/92	4.0	11.0	GW		X	x			x	x		
NK-MW-10	01101101392	10/13/92	3.5	10.5	GW		X	x			x	x		
NK-MW-12	01091052593	05/25/93	4.5	9.5	GW		X	x				X		
NK-MW-13	01101052593	05/25/93	5.0	15.0	GW		X	x				X		
NK-MW-15	01121052593	05/25/93	2.0	12.0	GW		x	x				X		
NK-MW-17	01141052593	05/25/93	4.0	9.0	GW		X	x				X		
NK-MW-14	01111052693	05/26/93	5.0	10.0	GW		x	x				X		
NK-MW-16	01131052693	05/26/93	3.5	13.5	GW		X	x				X		
SK-MW-14I	020141052693	05/26/93	10.0	15.0	GW		X	X				X		
SK-MW-14I	1016895	05/26/93	10.00	15.00	GW	X								
SK-MW-14I	13141052693	05/26/93	10.00	15.00	GW		X	X				X		
SK-MW-15I	02151052693	05/26/93	10.0	15.0	GW		X	x				X		
SK-MW-16	02161052693	05/26/93	4.50	9.50	GW		X	x				x		
SK-MW-05	1016815	06/01/93	6.00	11.00	GW	X								
SA-MW-04	1011982	03/18/96	7.50	17.50	GW		x							
SA-MW-05S	1011981	03/18/96	4.5	14.5	GW		x							
NA-MW-01	1011995	03/19/96	5.3	15.3	GW		x							
NA-MW-02	1011996	03/19/96	4.8	14.8	GW		x							
NA-MW-03	1011987	03/19/96	4.5	14.5	GW		x							
NA-MW-03	1011988	03/19/96	4.5	14.5	GW		x							
NA-MW-04	1011991	03/19/96	10.3	20.3	GW		x							
NA-PZ-02	1011997	03/19/96	5	10	GW		x							
NA-PZ-03	1011998	03/19/96	5	10	GW		x							
NA-PZ-04	1011999	03/19/96	5	10	GW		x							
NA-PZ-05	1012000	03/19/96	5	10	GW		x							
NA-PZ-06	1012001	03/19/96	5	10	GW		x							
NA-PZ-07	1012002	03/19/96	5	10	GW		x							
NA-PZ-08	1011994	03/19/96	5	10	GW		X							
NA-PZ-09	1011990	03/19/96	5	10	GW		x							
NA-PZ-10	1011989	03/19/96	5	10	GW		x							

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NA-PZ-11	1011986	03/19/96	5	10	GW		x							
SA-MW-01	1011985	03/19/96	13.00	18.00	GW		x							
SA-MW-02I	1011983	03/19/96	15.0	25.0	GW		x							
SA-MW-03	1011984	03/19/96	10.00	20.00	GW		x							
SA-PZ-01	1011993	03/19/96	5.00	10.00	GW		x							
SA-PZ-02	1011992	03/19/96	5.00	10.00	GW		x							
NK-MW-11	1016641	08/05/96	0.0		GW		X					X		x
NK-MW-12	1016638	08/05/96	4.5	9.5	GW		x					X		x
NK-MW-13	1016639	08/05/96	5.0	15.0	GW		x					X		x
NK-MW-19	1016640	08/05/96	1.7	10.7	GW		x					X		x
NA-MW-01	1016642	08/06/96	5.3	15.3	GW		x					X		x
NA-MW-01	1016643	08/06/96	5.3	15.3	GW		x					X		x
NA-MW-02	1016644	08/06/96	4.8	14.8	GW		x					X		x
NA-MW-03	1016647	08/06/96	4.5	14.5	GW		x					X		x
NA-MW-04	1016645	08/06/96	10.3	20.3	GW		x					X		x
NK-MW-02	1016650	08/06/96	5.0	10.0	GW		x					X		x
NK-MW-03	1016653	08/06/96	7.0	12.0	GW		X					X		x
NK-MW-04	1016651	08/06/96	7.0	12.0	GW		x					X		x
NK-MW-08	1016648	08/06/96	4.0	11.0	GW		x					X		x
NK-MW-10	1016649	08/06/96	3.5	10.5	GW		x					X		x
NK-MW-16	1016652	08/06/96	3.5	13.5	GW		X					X		x
NK-MW-01	1016661	08/07/96	7.0	12.0	GW		x					X		x
NK-MW-06	1016658	08/07/96	4.0	11.5	GW		x					X		x
NK-MW-07	1016660	08/07/96	5.0	12.5	GW		x					x		x
NK-MW-09	1016659	08/07/96	4.0	11.0	GW		x					X		x
NK-MW-14	1016655	08/07/96	5.0	10.0	GW		x					X		x
NK-MW-14	1016656	08/07/96	5.0	10.0	GW		x					X		x
NK-MW-15	1016662	08/07/96	2.0	12.0	GW		x					X		x
NK-MW-18	1016668	08/07/96	1.7	10.7	GW		x	x	x	x	x	x		x
SK-MW-01	1018049	09/10/96	8.00	13.00	GW		x				x	x		x
SK-MW-09	1018051	09/10/96	5.00	15.00	GW		x				x	X		x
SK-MW-10	1018050	09/10/96	5.00	15.00	GW		x				x	X		x
SK-MW-13	1018048	09/10/96	2.60	12.60	GW		x				x	X		x
SK-MW-02	1018172	09/11/96	9.00	19.00	GW		x				x	X		X
SK-MW-03	1018173	09/11/96	6.00	16.00	GW		x				x	X		x
SK-MW-04	1018174	09/11/96	5.60	15.60	GW		x				x	X		x
SK-MW-05	1018181	09/11/96	6.0	11.0	GW		X				x	X		x
SK-MW-06	1018184	09/11/96	7.00	12.00	GW		x					X		x
SK-MW-07	1018182	09/11/96	8.00	13.00	GW		X					X		x
SK-MW-11	1018183	09/11/96	5.00	15.00	GW		x				x	X		x
SK-MW-12	1018185	09/11/96	4.50	14.50	GW		X					X		x

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SK-MW-14I	1018180	09/11/96	10.0	15.0	GW		X				x	X		x
SK-MW-19	1018179	09/11/96	3.5	13.5	GW		X				x	X		x
SK-MW-21	1018176	09/11/96	3.5	13.5	GW		x				x	X		x
SK-MW-22	1018175	09/11/96	3.0	13.0	GW		x				x	X		x
SK-MW-24	1018177	09/11/96	3.0	13.0	GW		X				x	X		x
SK-MW-24	1018178	09/11/96	3.0	13.0	GW		X				x	X		x
SA-MW-01	1018194	09/12/96	13.00	18.00	GW		x					X		x
SA-MW-02I	1018191	09/12/96	15.00	25.00	GW		X					X		X
SA-MW-02I	1018192	09/12/96	15.0	25.0	GW		X					X		X
SA-MW-03	1018193	09/12/96	10.00	20.00	GW		x					x		x
SA-MW-04	1018190	09/12/96	7.50	17.50	GW		x					X		X
SA-MW-05I	1018189	09/12/96	13.50	23.50	GW		X					X		x
SA-MW-05S	1018188	09/12/96	4.50	14.50	GW		X					x		x
SK-MW-08S	1018196	09/12/96	7.5	12.5	GW		x					X		X
SK-MW-15I	1018105	09/12/96	10.0	15.0	GW		X	x	x	x	x	X		x
SK-MW-16	1018199	09/12/96	4.5	9.5	GW		x					x		X
SK-MW-20	1018104	09/12/96	4.0	14.0	GW		X		x	x	x	X		x
SK-MW-23	1018195	09/12/96	3	13	GW		x					X		x
SK-MW-08D	1018490	09/18/96	49.0	59.0	GW		x					X		x
NK-MW-17	1021036	11/04/96	4.0	9.0	GW		x					x		x
NA-MW-05	1026976	02/26/97	2.3	11.3	GW		X	x				X		x
NA-MW-06	1026977	02/26/97	2.0	11.0	GW		x	x				x		x
NA-MW-07	1026978	02/26/97	2.3	11.3	GW		x	x				x		x
NA-MW-02	1634441	06/02/97	4.8	14.8	GW							X		
NA-MW-03	1634438	06/02/97	4.5	14.5	GW							X		
NA-MW-03	1634439	06/02/97	4.5	14.5	GW							X		
NA-MW-04	1634440	06/02/97	10.3	20.3	GW							X		
NA-MW-05	1634443	06/02/97	2.3	11.3	GW		x					X		x
NA-MW-06	1634442	06/02/97	2.0	11.0	GW		x					X		x
NA-MW-07	1634444	06/02/97	2.3	11.3	GW		x					X		x
NK-MW-01	1634446	06/02/97	7.0	12.0	GW							x		
SA-MW-01	1634437	06/02/97	13.0	18.0	GW		x					X		
SA-MW-03	1634436	06/02/97	10.0	20.0	GW							X		
SK-MW-05	1634447	06/02/97	6.0	11.0	GW		X					X		
NK-MW-01	1634448	06/03/97	7.0	12.0	GW		x					x		
NK-MW-02	1634465	06/03/97	5.0	10.0	GW							x		
NK-MW-03	1634469	06/03/97	7.0	12.0	GW		x					x		
NK-MW-04	1634466	06/03/97	7.0	12.0	GW		x					X		
NK-MW-06	1634476	06/03/97	4.0	11.5	GW							x		
NK-MW-08	1634471	06/03/97	4.0	11.0	GW							x		

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NK-MW-09	1634472	06/03/97	4.0	11.0	GW		x					x		
NK-MW-10	1634470	06/03/97	3.5	10.5	GW		x					x		
NK-MW-11	1634473	06/03/97	0.0		GW		x					x		
NK-MW-12	1634462	06/03/97	4.5	9.5	GW		x					X		
NK-MW-13	1634463	06/03/97	5.0	15.0	GW		x					X		
NK-MW-14S	1634464	06/03/97			GW							x		
NK-MW-15	1634449	06/03/97	2.0	12.0	GW							X		
NK-MW-16	1634467	06/03/97	3.5	13.5	GW							X		
NK-MW-17	1634474	06/03/97	4.0	9.0	GW		x					X		
NK-MW-17	1634475	06/03/97	4.0	9.0	GW		x					X		
NK-MW-18	1634468	06/03/97	1.7	10.7	GW		X					x		
SK-MW-01	1634453	06/03/97	8.0	13.0	GW							X		
SK-MW-02	1634456	06/03/97	9.0	19.0	GW			x				x		x
SK-MW-03	1634455	06/03/97	6.0	16.0	GW							x		
SK-MW-04	1634454	06/03/97	5.6	15.6	GW							X		
SK-MW-09	1634450	06/03/97	5.0	15.0	GW		x					x		
SK-MW-10	1634451	06/03/97	5.0	15.0	GW							X		
SK-MW-10	1634452	06/03/97	5.0	15.0	GW							x		
NK-MW-07	1634489	06/04/97	5.0	12.5	GW		x					X		
SK-MW-06	1634480	06/04/97	7.0	12.0	GW							X		
SK-MW-07	1634482	06/04/97	8.0	13.0	GW		X					X		
SK-MW-08D	1634491	06/04/97	49.0	59.0	GW			x						x
SK-MW-08S	1634490	06/04/97	7.5	12.5	GW		x					x		
SK-MW-11	1634484	06/04/97	5.0	15.0	GW		x					X		
SK-MW-12	1634479	06/04/97	4.5	14.5	GW		x					X		
SK-MW-15I	1634483	06/04/97	10.0	15.0	GW		X					x		
SK-MW-16	1634478	06/04/97	4.5	9.5	GW		x	x						x
SK-MW-19	1634485	06/04/97	3.5	13.5	GW		X					X		
SK-MW-20	1634487	06/04/97	4.0	14.0	GW		X					x		
SK-MW-21	1634486	06/04/97	3.5	13.5	GW		x					X		
SK-MW-22	1634488	06/04/97	3.0	13.0	GW		x							
SK-MW-24	1634481	06/04/97	3.0	13.0	GW		X					X		
NK-MW-19	1634493	06/05/97	1.7	10.7	GW							X		
SA-MW-02I	1634496	06/05/97	15.0	25.0	GW		x	x				X		x
SA-MW-04	1634497	06/05/97	7.5	17.5	GW			x				X		x
SK-MW-13	1634495	06/05/97	2.6	12.6	GW							X		
SK-MW-23	1634494	06/05/97	3.0	13.0	GW		x					x		
NK-MW-09	1634503	06/06/97	4.0	11.0	GW							x		
SA-MW-05I	1634505	06/06/97	13.5	23.5	GW		x					x		
SA-MW-05S	1634504	06/06/97	4.5	14.5	GW		x					x		
SK-MW-08D	1634506	06/06/97	49.0	59.0	GW							X		
SK-MW-14I	1634502	06/06/97	10.0	15.0	GW		X	X				X		
SK-MW-22	1634499	06/06/97	3.0	13.0	GW							X		

SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES BY DATE
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extractions	Miscellaneous
NA-MW-05	1647307	11/18/97	2.3	11.3	GW		x							X
NA-MW-06	1647308	11/18/97	2.0	11.0	GW		x							x
NA-MW-07	1647309	11/18/97	2.3	11.3	GW		x							x
NA-MW-07	1647310	11/18/97	2.3	11.3	GW		x							x
NK-MW-18	1647311	11/18/97	1.7	10.7	GW		x							
SA-MW-01	1647313	11/18/97	13.0	18.0	GW		x							
SA-MW-02I	1647316	11/18/97	15.0	25.0	GW		x	x						x
NA-MW-05	1647327	11/19/97	2.3	11.3	GW							X		
NA-MW-06	1647328	11/19/97	2	11	GW							X		
NA-MW-07	1647329	11/19/97	2.3	11.3	GW							X		
NK-MW-02	1647335	11/19/97	5.0	10.0	GW							x		
NK-MW-03	1647332	11/19/97	7.0	12.0	GW							x		
NK-MW-04	1647334	11/19/97	7.0	12.0	GW		x					x		
NK-MW-08	1647336	11/19/97	4.0	11.0	GW		x					X		
NK-MW-16	1647333	11/19/97	3.5	13.5	GW		X					X		
NK-MW-18	1647331	11/19/97	1.7	10.7	GW							X		
NK-MW-19	1647330	11/19/97	1.7	10.7	GW							X		
SA-MW-01	1647326	11/19/97	13	18	GW							X		
SA-MW-02I	1647324	11/19/97	15.0	25.0	GW							X		
SA-MW-03	1647325	11/19/97	10	20	GW							x		
SA-MW-04	1647320	11/19/97	7.5	17.5	GW			x				x		x
SA-MW-05I	1647322	11/19/97	13.5	23.5	GW		x					X		
SA-MW-05I	1647323	11/19/97	13.5	23.5	GW		x					x		
SA-MW-05S	1647321	11/19/97	4.5	14.5	GW		x					x		
NA-MW-01	1647387	11/20/97	5.3	15.3	GW							x		
NA-MW-02	1647386	11/20/97	4.8	14.8	GW							x		
NA-MW-03	1647384	11/20/97	4.5	14.5	GW							X		
NA-MW-04	1647385	11/20/97	10.3	20.3	GW		x					x		x
NK-MW-06	1647389	11/20/97	4	11.5	GW							X		
NK-MW-07	1647390	11/20/97	5	12.5	GW		X					x		
NK-MW-09	1647394	11/20/97	4.5	9.5	GW		x					x		
NK-MW-10	1647395	11/20/97	3.5	10.5	GW		x					x		
NK-MW-11	1647393	11/20/97			GW		x					x		
NK-MW-12	1647392	11/20/97	4.5	9.5	GW		x					X		
NK-MW-13	1647391	11/20/97	5	15	GW		x					X		
NK-MW-14	1647398	11/20/97	4.5	9.5	GW							x		
NK-MW-17	1647388	11/20/97	4.0	9.0	GW		x					x		
NK-PZ-01	1647397	11/20/97			GW		x					X		X
NK-PZ-02	1647396	11/20/97			GW		x					X		X
SK-MW-06	1647337	11/20/97	7.0	12.0	GW							X		
SK-MW-07	1647347	11/20/97	8.0	13.0	GW		x					X		
SK-MW-11	1647345	11/20/97	5.0	15.0	GW		x					X		

SUMMARY OF GROUNDWATER SAMPLING AND ANALYSES BY DATE
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extractions	Miscellaneous
SK-MW-12	1647338	11/20/97	4.5	14.5	GW		x					X		
SK-MW-12	1647339	11/20/97	4.5	14.5	GW		x					X		
SK-MW-14I	1647342	11/20/97	10.0	15.0	GW		X	X				x		
SK-MW-15I	1647346	11/20/97	10.0	15.0	GW		X					X		
SK-MW-16	1647340	11/20/97	4.5	9.5	GW		x	x						x
SK-MW-19	1647341	11/20/97	3.5	13.5	GW		X					X		
SK-MW-21	1647343	11/20/97	3.5	13.5	GW		X					x		
SK-MW-24	1647344	11/20/97	3.0	13.0	GW		X					x		
SK-MW-05	1647352	11/21/97	6.0	11.0	GW		x					X		
SK-MW-08D	1647357	11/21/97	49.0	59.0	GW		x					X		
SK-MW-09	1647354	11/21/97	5.0	15.0	GW		x					x		
SK-MW-20	1647353	11/21/97	4.0	14.0	GW		X					x		
SK-MW-22	1647351	11/21/97	3.0	13.0	GW		x					X		
SK-MW-23	1647355	11/21/97	3.0	13.0	GW		x					x		
SK-MW-23	1647356	11/21/97	3.0	13.0	GW		x					x		
NK-MW-01	1647364	11/24/97	7.0	12.0	GW							x		
NK-MW-15	1647365	11/24/97	2.0	12.0	GW							X		
SK-MW-01	1647368	11/24/97	8.0	13.0	GW							X		
SK-MW-02	1647371	11/24/97	9	19	GW			x				X		x
SK-MW-03	1647370	11/24/97	6.0	16.0	GW							X		
SK-MW-04	1647369	11/24/97	5.6	15.6	GW							x		
SK-MW-08S	1647373	11/24/97	7.5	12.5	GW			x				x		x
SK-MW-10	1647366	11/24/97	5.0	15.0	GW							X		
SK-MW-10	1647367	11/24/97	5.0	15.0	GW							x		
SK-MW-13	1647372	11/24/97	2.6	12.6	GW							x		
SA-MW-04	1654131	02/06/98	7.5	17.5	GW		x	x			x	X		X
SA-MW-04	1654131f	02/06/98	7.5	17.5	GW							X		

Notes: 1. Legend: X - Analysed; at least one analyte over the detection limit; x - Analysed, no analytes in group over the detection limit

2. Printed on 06/04/98

LOUREIRO ENGINEERING ASSOCIATES, INC.

June 11, 1998

US Environmental Protection Agency
JFK Federal Building (HBT)
90 Canal Street
Boston, MA 02203-2211

Attn.: Juan Perez

RE: Summary Investigation and Remediation Report - Airport/Klondike Area
Pratt & Whitney, East Hartford, Connecticut
LEA Comm. No. 68V8124

Dear Mr. Perez:

Attached please find six copies of additional information for the above-mentioned report for the Airport/Klondike Area at the Pratt & Whitney facility located at 400 Main Street in East Hartford, Connecticut. The information provided in this package includes the following:

- Technical Memorandum (TM) 6 Surface Water and Sediment Sampling (New)

The information identified as "New" has not been previously submitted for review.

If you have any questions or comments concerning the attached information please contact me at 860-747-6181.

Sincerely,

LOUREIRO ENGINEERING ASSOCIATES

FOR Thomas J. Salimeno, P.E.
Project Manager

Attachments

pc: V. Riva, Pratt & Whitney

100 NORTHWEST DRIVE • PLAINVILLE, CT 06062 • 860) 747-6181 • FAX (860) 747-8822

LOUREIRO ENGINEERING ASSOCIATES, INC.

June 10, 1998

US Environmental Protection Agency
JFK Federal Building (HBT)
90 Canal Street
Boston, MA 02203-2211

Attn.: Juan Perez

RE: Summary Investigation and Remediation Report - Airport/Klondike Area
Pratt & Whitney, East Hartford, Connecticut
LEA Comm. No. 68V8124

Dear Mr. Perez:

Attached please find six copies of additional information for the above-mentioned report for the Airport/Klondike Area at the Pratt & Whitney facility located at 400 Main Street in East Hartford, Connecticut. The information provided in this package includes the following:

- Historical Groundwater Data - Metals (4 sheets)
- Historical Groundwater Data - PCBs, SVOCs, & TPH (4 sheets)

These two sets of historical groundwater data drawings in addition to the set that was sent to you yesterday will comprise twelve drawings in total for each summary report. These drawings should be appended to *Technical Memorandum 3*.

If you have any questions or comments concerning the attached information please contact me at 860-747-6181.

Sincerely,

LOUREIRO ENGINEERING ASSOCIATES

Thomas J. Salimeno, P.E.
Project Manager

Attachments

pc: V. Riva, Pratt & Whitney

100 NORTHWEST DRIVE • PLAINVILLE, CT 06062 • (860) 747-6181 • FAX (860) 747-8822

LOUREIRO ENGINEERING ASSOCIATES, INC.

June 10, 1998

US Environmental Protection Agency
JFK Federal Building (HBT)
90 Canal Street
Boston, MA 02203-2211

Attn.: Juan Perez

RE: Summary Investigation and Remediation Report - Airport/Klondike Area
Pratt & Whitney, East Hartford, Connecticut
LEA Comm. No. 68V8124

Dear Mr. Perez:

Attached please find six copies of additional information for the above-mentioned report for the Airport/Klondike Area at the Pratt & Whitney facility located at 400 Main Street in East Hartford, Connecticut. The information provided in this package includes the following:

- Technical Memorandum (TM) 4 Background Soil Sampling and Analysis (New)

The information identified above as "New" has not been previously submitted for review.

If you have any questions or comments concerning the attached information please contact me at 860-747-6181.

Sincerely,

LOUREIRO ENGINEERING ASSOCIATES

Thomas J. Salimeno, P.E.
Project Manager

Attachments

pc: V. Riva, Pratt & Whitney

100 NORTHWEST DRIVE • PLAINVILLE, CT 06062 • (860) 747-6181 • FAX (860) 747-8822

DRAFT

TECHNICAL MEMORANDUM 1
MONITORING WELL INSTALLATION AND DEVELOPMENT AND SOIL SAMPLING

SUMMARY
SITE INVESTIGATION AND REMEDIATION REPORT
AIRPORT/KLONDIKE AREA
AT
PRATT & WHITNEY
EAST HARTFORD, CONNECTICUT
EPA ID No. CTD990672081

Prepared for:

PRATT & WHITNEY
400 Main Street
East Hartford, Connecticut 06108

Prepared by:

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut 06062

LEA Comm. No. 68V8124

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TABLES

DRAWINGS

ATTACHMENTS

Acronyms

AEL	Averill Environmental Laboratory, Inc.
DEP	State of Connecticut Department of Environmental Protection
DPH	State of Connecticut Department of Public Health
FID	Flame-Ionization Detector
H&A	Haley & Aldrich, Inc.
LEA	Loureiro Engineering Associates, Inc.
M&E	Metcalf & Eddy, Inc.
NTU	Nephelometric Turbidity Unit
P&W	Pratt & Whitney
PETG	Polyethylene Teraphthalate Copolyester
PID	Photo-Ionization Detector
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QUANT	Quanterra Environmental Services, Inc.
RCSA	Regulations of Connecticut State Agencies
SOP	Standard Operating Procedure
TM	Technical Memoranda
USTM	Unit-Specific Technical Memorandum
VOC	Volatile Organic Compound

1. INTRODUCTION

1.1 Purpose and Objective

This Technical Memorandum (TM) presents the methodology and results of the monitoring well installation and development and the soil sampling methodology used in the Airport/Klondike Area of the Pratt & Whitney (P&W) facility located at 400 Main Street (Main Street facility) in the Town of East Hartford, Connecticut. Monitoring wells were installed and developed by Loureiro Engineering Associates, Inc. (LEA) as part of the Site investigation activities to augment the existing monitoring well network. The new monitoring well locations were chosen to provide additional information on subsurface hydrogeologic conditions.

Additionally, this TM describes the methodology used for the installation of Geoprobe® screenpoint groundwater samples. Screenpoint samples were used in place of permanent or temporary monitoring wells to provide a "snapshot" of the groundwater quality.

Obtaining additional information on the subsurface hydrogeologic conditions included the following objectives:

- Explore the lithology and hydraulic characteristics of the overburden materials across the Site.
- Better define the groundwater levels to establish both the horizontal gradients and groundwater flow directions and the degree of groundwater/surface water interaction.
- Better define areas of contaminated groundwater.

1.2 Background

The Airport/Klondike Area is located on the eastern portion of the P&W Main Street facility on the east side of the main plant, north of Brewer Street and south of Silver Lane. The Airport/Klondike Area consists of four study areas that include the North and South Airport Areas and the North and South Klondike Areas. Previous investigations at the Site performed from 1990 through 1993 resulted in the installation and sampling of groundwater monitoring wells and temporary wellpoints throughout the Airport/Klondike Area.

In the North Airport Area, wells NA-MW-01 through NA-MW-04 were installed in October

1991 during the Site-Wide Environmental Monitoring Program at the Main Street facility by Haley & Aldrich, Inc. (H&A). In the North Airport Area, piezometers NA-PZ-01 through NA-PZ-12 were installed in November 1991 during the Site-Wide Environmental Monitoring Program.

In the North Klondike Area, wells NK-MW-01 through NK-MW-05 were installed in February 1990 during the Preliminary Reconnaissance Survey of the Airport/Klondike Area by Westinghouse Environmental and Geotechnical Services, Inc. (Westinghouse). Wells NK-MW-06 and NK-MW-07 were installed in October 1991 during the Site-Wide Environmental Monitoring Program. Wells NK-MW-08 through NK-MW-10 were installed in October 1992 during the Environmental Assessment of the Former PCB Storage Building by H&A. Wells NK-MW-12 through NK-MW-17 were installed in about April 1993 during the Klondike Area Site Investigation by Metcalf & Eddy, Inc. (M&E). Two additional monitoring wells, NK-MW-18 and NK-MW-19, were installed in July 1996 by LEA as part of the most recent investigation activities.

In the South Klondike Area, wells SK-MW-01 through SK-MW-08S and SK-MW-8D were installed in February 1990 during the Preliminary Reconnaissance Survey. Wells SK-MW-09 through SK-MW-13 were installed in October 1991 during the Site-Wide Environmental Monitoring Program. Wells SK-MW-14I, SK-MW-15I, and SK-MW-16 were installed in about April 1993 during the Klondike Area Site Investigation. Six additional monitoring wells, SK-MW-18 through SK-MW-24, were installed in August 1996 by LEA as part of the most recent investigation activities.

In the South Airport Area, monitoring wells SA-MW-01 and SA-MW-02I were installed in February 1990 during the Preliminary Reconnaissance Survey. Wells SA-MW-03 through SA-MW-05S and SA-MW-05I were installed in October 1991 during the Site-Wide Environmental Monitoring Program. In the South Airport Area, piezometers SA-PZ-01 and SA-PZ-02 were installed in November 1991 during the Site-Wide Environmental Monitoring Program.

1.3 Scope

This TM covers the methodologies and rationale used for the installation of monitoring wells, Geoprobe® prepack monitoring wells, piezometers, and stream gauges at the Site during the period from 1993 to the present. This TM also covers the methods employed to sample soil during monitoring well installation. However, this TM does not cover soil sampling methodologies not associated with monitoring well installation but conducted during the

installation of soil borings as part of the contaminant delineation activities at the Site. In addition, this TM also does not cover specific chemical analyses of soil samples collected during the monitoring well installation as these data are discussed in the appropriate Unit-Specific Technical Memorandum (USTM), or the chemical analyses of groundwater samples collected from these monitoring wells as these are discussed in TM 3, *Groundwater Quality and Sampling.*

1.4 General Geologic and Hydrogeologic Conditions

The geologic and hydrogeologic characteristics of the Site are discussed in detail in the main body of this report. In general, the surficial materials, in which the majority of the monitoring wells are screened, consist of medium to fine grained sands with trace levels of fine gravels and coarse sands. These sediments are generally post-glacial, fluvial deposits associated with the Connecticut River, although in many places the upper portion of these sediments has been anthropogenically disturbed during on-site construction activities. Beneath the fluvial sediments are glaciolacustrine sediments, primarily laminated silts and clays, associated with glacial Lake Hitchcock. The basal sediment layer over most of the area is glacial till and stratified drift. Bedrock in the general East Hartford area consists of Triassic Age, interbedded arkoses and basalts. Bedrock in the area has a general slight dip eastward cut by widespread steep faults.

The regional drainage basin is the Upper Connecticut River Basin. Regional flow in the unconsolidated materials of this part of the basin is to the west, towards the Connecticut River. Local groundwater flow is also controlled to some extent by local drainage sub-basins and topography. The upper portion of the unconsolidated sediments serves as the primary aquifer in the area. Groundwater flow in the bedrock is primarily within fractures and fault planes, and to a lesser extent within the rock matrix. The local bedrock aquifer would be adequate as a residential water supply source, but groundwater yields are typically too low to be of commercial or industrial use.

1.5 Well Locations and Rationale

Monitoring wells have been installed at the Site over the course of several years as parts of a variety of environmental investigations. Monitoring wells and piezometers have been installed to provide overall groundwater flow patterns, overall groundwater quality, water-table elevation data for Rentschler Airport drainage, and area-specific groundwater quality information. In general, monitoring wells and piezometers installed by LEA have been designed to address specific groundwater quality issues in areas of known or suspected groundwater contamination, or to provide additional background groundwater quality and water-table elevation data.

In many cases, these monitoring wells were located on the basis of historical information regarding Site operations, or on the basis of field observations made during numerous Site walkovers and visits. Information on historical operations has been obtained from various reports, aerial photographs, engineering drawings and plans, and P&W internal memoranda. More detail on historical operations is included in the main body of this report as well as in the USTMs.

Based on information collected from existing monitoring wells, monitoring wells and piezometers installed during this Site investigation have been screened in the upper portion of the unconsolidated aquifer. Monitoring wells and piezometers have been installed to address specific potential contaminant release issues and to supplement the existing monitoring well network. In some cases, the location of a monitoring well has been chosen on the basis of groundwater quality information collected from Geoprobe® screenpoint groundwater samples. In other cases, monitoring wells have been located on the basis of soil quality data derived from the soil boring program. A summary for the location rationale for the monitoring wells and piezometers is presented in Table 1.

2. METHODOLOGY

This section presents the methods and techniques used to install the monitoring wells and piezometers at the Site. These methods were used by LEA, although some of the general procedures and methods were also used by previous consultants and contractors who installed the existing monitoring wells.

2.1 General Procedures

Monitoring wells in the Airport/Klondike Area have been installed by conventional hollow-stem auger drilling rigs and by direct-push techniques using the LEA Geoprobe® drilling rig. Monitoring wells have been installed at the Site since approximately 1980. This TM discusses the installation methods and soil sampling procedures used to install the monitoring wells emplaced at the Site since approximately 1990. Where possible, reference is made to techniques and methodologies used to install existing monitoring wells by previous consultants and contractors. However, this information has been taken from available literature and does not constitute first-hand knowledge of the installation procedures or sampling methodologies. In addition, some information regarding monitoring well construction and/or soil sampling was not reported.

Wells installed during the most recent investigation activities were installed in general accordance with the procedures described in the LEA Standard Operating Procedure (SOP) *Standard Operating Procedure for Hollow Stem Auger Borings* and the LEA SOP for *Standard Operating Procedure for Monitoring Well Installation.*

2.2 Drilling Methods

Two drilling methods were used to install monitoring wells, both historical monitoring wells and those installed as part of the most recent investigation activities, in the Airport/Klondike Area. The methods used were hollow-stem augering and Geoprobe® direct-push techniques. Each of these methods is briefly described below.

The hollow-stem auger drilling method used continuous-flight hollow stem augers for monitoring well installation. The typical auger used had an inside diameter of 4.25 inches and a length of 5 feet. A pilot assembly, consisting of a surface-retractable plug for the lead-auger head, was used to avoid filling the augers with formation material. Continuous sampling with a split-spoon sampler was performed in advance of the augers. The split-spoon sampler consisted

of a 24-inch long by 1.375-inch inside diameter steel sampling tube. The split-spoon sampler was driven through the 2-foot sampling interval with a 140-pound hammer with a 30-inch drop. After the split-spoon sampler was retrieved, the sampler was transferred to the attending geologist for sampling and logging. Drilling fluids were not required during the installation of soil borings using hollow-stem augers.

The direct-push techniques with the LEA Geoprobe® 5400 were used to install soil borings and both temporary and permanent monitoring wells. Direct-push techniques involved the initial installation of a soil boring to depth using Geoprobe® soil sampling techniques. Boreholes were advanced using the Geoprobe® Macro-Core® soil sampling equipment. Upon completion of the soil boring, an installation casing, sealed at the tip with an expendable stainless-steel point, was advanced to depth. The expendable stainless-steel point was used to avoid filling the casing with formation material.

The Macro-Core® system consisted of a 48-inch long by 2-inch outside diameter steel sampling tube outfitted with disposable 46-inch long by 1.75-inch diameter polyethylene teraphthalate copolyester (PETG) liners. The soil sampler was outfitted with a new liner and a fitted piston tip, and the entire unit was driven to the top of the sampling interval with the Geoprobe® rig. The purpose of the fitted piston tip was to seal the end of the sampling tube against the introduction of formation material during advancement. The piston tip was released by the operator, the sampler was driven to the final sampling depth by a combination of percussive hammering and direct pressure, and the sampler was retrieved. After the sampler was retrieved, the soil-filled liner was removed from the sampler and transferred to the attending geologist for sampling and logging.

2.3 Soil Sampling Methods

Soil samples collected from soil borings were sampled in general accordance with the procedures described in the LEA SOP *Standard Operating Procedure for Soil Sampling*. Continuous soil sampling was performed during the advancement of all boreholes. Soil sampling procedures were similar for split-spoon samples and for Geoprobe® Macro-Core® samples

Immediately after collection, all soil samples were examined by the attending geologist for indications of contamination, such as the presence of visible free-phase petroleum, visible staining, or the incidental presence of odors. Soil samples were collected directly into laboratory supplied glass sample containers with Teflon®-lined lids for submission to an off-site laboratory for possible analysis. In addition, a 5-gram aliquot of the soil was collected directly into a 40-

milliliter vial with a Teflon® septum for submittal to the LEA Analytical Laboratory for analysis for target VOCs. After sample collection, all soil samples were field headspace screened with either a photoionization detector (PID) or flame ionization detector (FID) for the presence of volatile organic compounds (VOCs).

2.4 Borehole Logging

After the retrieved soil was sampled for possible analysis at an off-site laboratory and field headspace screening, the attending geologist also described the soils using a modified Burmister Classification System. The geologic descriptions were recorded on standardized "Geologic Boring Log" forms in accordance with the LEA SOP *Standard Operating Procedure for Geologic Logging of Unconsolidated Sedimentary Materials*. The general data recorded for the subsurface materials encountered included the estimated grain size ranges according to the Burmister Classification Scheme, color, relative degree of water saturation, and visible sedimentary structures.

2.5 Installation of Monitoring Wells

Following completion of each borehole to the desired depth, monitoring wells were installed in general accordance with the LEA SOP *Standard Operating Procedure for Monitoring Well Installation*. The screened interval for the monitoring well was specified by the geologist based on the observed depth to water, the materials encountered, and the presumed water-table fluctuations to be expected.

During monitoring well installations, additional information regarding the monitoring well construction details was recorded on standardized "Monitoring Well Construction" log forms in accordance with the LEA SOP *Standard Operating Procedure for Monitoring Well Installation*. The general information recorded included the types and construction of the well materials, the screened interval, the dimensions and materials of the filter pack, the backfill materials, and the surface completion of the monitoring well.

2.5.1 Installation of Standard Monitoring Wells

For monitoring wells installed with conventional hollow-stem auger drill rigs, 2-inch diameter polyvinyl chloride (PVC) well materials were selected based on the need to allow groundwater sampling and minimize the volume of waste soil and purge water generated.

The 2-inch PVC well material was installed in the borehole to the specified depth interval. All PVC well materials were pre-cleaned by the manufacturer and kept in the sealed packaging prior to installation in the borehole. From bottom to top, the well materials consisted of a 2-inch diameter PVC end cap, a 5- or 10-foot length of 0.010-inch (No. 10 slot) mill-slotted PVC screen, and an appropriate length of 2-inch diameter PVC blank casing (riser). The well materials were joined by factory-threaded ends. Total well screen lengths were kept to 10 feet or less to allow sampling of discrete intervals while allowing a sufficient length of open screen for water-table fluctuations.

After the well materials were in place, a filter sand pack was installed from the bottom of the screened interval to a depth of at least 6 inches above the screened interval. The shallow thickness of filter pack above the screened interval was necessary in some cases due to the shallow depth to water and the need to provide a sufficient length of screen above the existing water table to allow for natural water-table fluctuations throughout the year while also leaving space for completion of the necessary components for well construction. The filter pack material was typically chosen based on previous field experience at the Site. The filter pack material typically consisted of Morie No. 00, No. 0, or No.1 sand, or the equivalent.

Above the filter pack, a bentonite chip or pellet seal was placed to prevent surface contamination from entering the well screen. The thickness of the annular seal ranged from approximately 6 inches to 2 feet depending on the available annular space. The bentonite seal was hydrated with potable or distilled water when placed above the water table. Typically, the annular seal was made sufficiently thick so that the top of the annular seal was coincident with the base of the concrete pad.

Monitoring wells were completed with either above-grade or at-grade wellhead completions, depending upon the anticipated level of traffic in the vicinity of the well. The concrete pads on all monitoring wells were originally intended to be 3 foot by 3 foot by 3 foot. However, due to the shallow depth to groundwater in some areas of the Site, some concrete pads were as thin as 2 feet. Above-grade wellhead completions consisted of protective steel casings with locking caps. The protective casings were approximately 5 feet long with the base of the protector placed approximately at the bottom of the concrete pads. The top of the protective casing was approximately 0.2 to 0.4 feet above the top of the PVC riser. At-grade wellhead completions consisted of a steel protective roadbox and a locking plug for the monitoring well PVC riser. The concrete pads were constructed so as to slope away from the monitoring well to allow precipitation to drain away from the protector and not pond at the well. A survey reference point was installed at all monitoring well locations installed by conventional drilling rigs.

2.5.2 Installation of Geoprobe® Prepack Monitoring Wells

Direct-push techniques with the LEA Geoprobe® 5400 were used to install both temporary and permanent monitoring wells. Direct-push techniques for permanent monitoring well installations involved the initial installation of a soil boring to depth using Geoprobe® soil sampling techniques. Boreholes were advanced using the Geoprobe® Macro-Core® soil sampling equipment. Upon completion of the soil boring, an installation casing, sealed at the tip with an expendable stainless-steel point, was advanced to depth. The expendable stainless-steel drive point was used to avoid filling the casing with formation material.

The installation casing was a 2.125-inch outside diameter threaded steel casing with an expendable drive point at the downhole end. The expendable drive point was held in-place during casing advancement by an O-ring. The O-ring also maintained the watertight integrity of the casing during advancement to depth. The monitoring well was installed within the installation casing.

The base of the screened section of the Geoprobe® monitoring well was fitted with a coupling which attached to the expendable drive point and anchored the screen and riser into place. The prepack screened sections were composed of interlocking, 3-foot long, 0.5-inch diameter, 0.010-inch slotted Schedule 80 PVC surrounded by a 1.5-inch diameter stainless steel mesh which held the filter pack sand in place. The filter pack consisted of a 20/40 grade silica sand.

The prepack screens were placed into the installation casing and an appropriate length of 0.5-inch diameter Schedule 80 PVC riser was attached. After lowering the well sections to the base of the casing, the well was attached to the expendable drive point by driving the well down sharply. After the well was attached to the drive point, the installation casing was withdrawn from the borehole while an approximately 2-foot thick sand cap was placed above the screen. The purpose of the sand cap was to isolate the screened interval from the bentonite seal and prevent bentonite from infiltrating into the screen. A bentonite seal was placed above the sand cap. This seal was typically brought to the surface in the Airport/Klondike Area due to the relatively shallow depth to the water-table. The monitoring wells were completed with either above-grade or at-grade wellhead completions similar to those described above for standard monitoring wells.

Temporary monitoring wells were used in instances where a groundwater sample was required and where a water-table elevation measurement may also have been desired. Temporary monitoring wells were not completed with roadboxes, filter packs, or bentonite seals, but were

typically constructed of 1-inch diameter Schedule 80 PVC screen and riser installed directly in the open borehole and sampled immediately.

In some instances, a small amount of filter pack sand was added to stabilize the borehole, but a bentonite seal was not typically used because of the possible difficulty in removing the temporary well. Temporary wells were not left in place for extended periods of time. These temporary wells were installed only for as long as necessary to collect a groundwater sample, to survey the elevation, or to collect water-table elevation data. Temporary monitoring wells were removed and the boreholes abandoned by filling with bentonite.

2.5.3 Installation of Screenpoint Samples

Screenpoint groundwater samples were collected using a Geoprobe® Screen Point Sampler® prior to approximately February 1997 and a Geoprobe® SP-15 Screen-Point Sampler® since approximately February 1997. Screenpoint sampling devices were typically employed in "unsampled" boreholes within 6 to 12 inches of "sampled" boreholes. In this manner, the groundwater samples collected from the screenpoint sampling devices represent undisturbed groundwater from the same interval as the corresponding soil samples from the immediately adjacent soil borings.

The Screen Point Sampler® consisted of a 22-inch long, stainless-steel wire mesh insert and sleeve that was driven to depth in a protective sheath with an expendable drive point. The wire mesh insert and sleeve were held in place in the protective sheath by the expendable drive point which in turn was held in place by inert O-ring seals and the pressure of being pushed through the formation. After the screen was driven to depth, the drill rods were retracted approximately 24 inches, and the expendable drive point remained in place, creating a void in the formation. The Screen Point Sampler® was manually extended into the void while the sheath and drill rods sealed the borehole above the sampler. After the sampler had been emplaced, a groundwater sample was collected using standard sampling techniques. Groundwater sampling methodologies and results are discussed in TM 3, *Groundwater Quality and Sampling*.

The SP-15 Screen Point Sampler® consisted of an approximately 42-inch long, stainless steel, wire-wound screen and metal sheath provided with an expendable drive point. After the screen was driven to depth, the drill rods were retracted approximately 44 inches, and the expendable drive point remained in place, creating a void in the formation. The SP-15 screen was manually extended into the void while the sheath and drill rods sealed the borehole above the sampler. After the sampler has been emplaced, a groundwater sample was collected using standard

techniques. Groundwater sampling methodologies and results are discussed in TM 3, *Groundwater Quality and Sampling.*

After the collection of groundwater samples from either a Screen-Point Sampler® or an SP-15 Screen-Point Sampler® , the screens, sheaths, and drill rods were removed, and the expendable drive points remained in place as the borehole was abandoned.

2.6 Historical Monitoring Wells

Monitoring wells have been installed at the Site since approximately 1990. These monitoring wells have included monitoring wells with shallow, intermediate, and deep screened intervals. Shallow monitoring wells were constructed such that the screened interval was placed across the water-table. Intermediate depth monitoring wells were constructed such that the screened interval was typically at the base of the upper aquifer, below the water table. In several cases, the monitoring wells indicated as intermediate were constructed with screened intervals immediately below the water table.

The first sixteen monitoring wells at the Site appear to have been installed in 1990 under the supervision of Westinghouse during the Preliminary Reconnaissance Survey of the Airport/Klondike Area. Fifteen shallow/intermediate depth overburden monitoring wells, NK-MW-01I, NK-MW-02I, NK-MW-03I, NK-MW-04I, NK-MW-05S, SA-MW-01I, SA-MW-02I, SK-MW-01I, SK-MW-02I, SK-MW-03I, SK-MW-04I, SK-MW-05S, SK-MW-06I, SK-MW-07I, and, SK-MW-08S, installed during this survey were reported to have been installed using hollow-stem auger boring techniques. One deep monitoring well, SK-MW-08D, was installed using drive-and-wash techniques to avoid the possibility of cross-contaminating the deeper portion of the upper aquifer.

During the installation of these historical monitoring wells, split-spoon samples were collected every five feet and selectively screened for the presence of VOCs. Geologic boring logs including the available monitoring well construction details are presented in Attachment A. The monitoring well construction details are also summarized in Table 2.

In 1992, fifteen additional monitoring wells were installed in the Airport/Klondike Area under the supervision of H&A as part of a Site-Wide Environmental Monitoring Program. The fifteen shallow/intermediate depth overburden monitoring wells, NA-MW-01, NA-MW-02I, NA-MW-03, NA-MW-04I, NK-MW-06, NK-MW-07, SA-MW-03, SA-MW-04, SA-MW-05S, SA-MW-05I, SK-MW-09, SK-MW-10, SK-MW-11, SK-MW-12, and SK-MW-13, were advanced using

hollow-stem augers. Copies of all available geologic boring logs are included in Attachment A. Available construction details for these monitoring wells are summarized in Table 2.

In addition to the fifteen monitoring wells described above, fourteen piezometers were also installed. These piezometers, NA-PZ-01 through NA-PZ-12, SA-PZ-01, and SA-PZ-02, were installed in areas where groundwater quality monitoring was not anticipated to be required, but where groundwater elevation data could not otherwise be obtained. These piezometers were generally installed in the same manner as the monitoring wells, however, no soil sampling was performed during the installations. No geologic boring logs were recorded for these piezometers. Available construction details for these piezometers are summarized in Table 2.

2.7 Monitoring Well Development

Monitoring wells were developed in accordance with the procedures outlined in the LEA SOP *Standard Operating Procedure for Monitoring Well Installation.* Development waters were originally placed into portable containers until they were placed into 55-gallon drums as described in Section 2.11.

Monitoring wells were developed by alternately over-pumping, using a submersible pump to draw down the water level in the well, and surging to flush fine sediment from the aquifer through the screen to be subsequently removed. After the well was initially pumped, the well was then surged using a surge block or inertial pump. With the surge block or inertial pump, the well was surged beginning at the bottom of the screened interval and working upward to the top of the screen. After surging, the well was pumped to remove suspended sediments. This cycle was repeated until the well development criteria had been met.

Monitoring wells were developed until the following criteria were met:

- Removal of at least three well volumes.
- Stability of the physical parameters of temperature and specific conductance. Values for these parameters must be within ten percent over three sequential water samples with a minimum of one well volume extracted between samples.
- Turbidity must be less than approximately twenty Nephelometric turbidity units (NTU) at completion, and the water must be clear.
- The pH must be lower than 9.0 and stable within 0.1 pH unit.

2.8 Soil Physical Properties Testing

Soil physical properties testing was not typically performed on soil samples collected during monitoring well installations. Soil physical properties testing is often performed during monitoring well installations to provide information on the grain size distribution of the aquifer so that a suitable filter pack material may be selected. However, soil physical properties testing was performed in 1992 as part of the Site-Wide Environmental Monitoring Program performed by H&A, Inc. Matrix porosity testing and grain size analyses were performed on selected soil samples collected from across the site.

In general, the results of the grain size distribution analysis indicate that the upper aquifer materials at the Site are a brown to red brown, medium to fine sand, with traces of fine gravel and coarse sand. The results of the matrix porosity testing are also relatively uniform indicating typical matrix porosity values of between 36.6 and 43.3 percent for the upper aquifer sediments at the Airport/Klondike Area (H&A, 1993). A summary of the available soil physical property data is presented in Table 3.

2.9 Decontamination of Materials and Equipment

The purpose of consistent decontamination procedures was to prevent the potential spread of contamination between boreholes and samples and from the immediate work area around the well borehole. All equipment and materials placed into a borehole, or associated with the collection and sampling of soil from a borehole, was decontaminated prior to initiating the drilling activities and between individual samples, as appropriate. Decontamination procedures are presented in the LEA SOP *Standard Operating Procedure for Hollow Stem Auger Soil Borings*.

Drilling rigs and downhole equipment (e.g., hollow-stem augers, bits, etc.) were decontaminated by steam-cleaning prior to initiating any drilling activities at the Site. Steam-cleaning took place at a decontamination pad. The decontamination pad was typically a portable plastic or metal basin of sufficient volume to hold augers and other drilling equipment and which could be laid beneath the back end of the drilling rigs to contain the spent decontamination fluids.

Sampling equipment such as split-spoons and stainless steel spatulas were decontaminated between uses in the field at the drilling site or the decontamination pad. The sampling equipment was decontaminated using the following procedure:

- Brush off gross soil particles.

- Wash and scrub equipment with phosphate-free detergent.
- Rinse equipment with deionized water.
- Rinse equipment with dilute nitric acid solution.
- Rinse equipment in deionized water.
- Rinse equipment with dilute methanol/water solution.
- Rinse equipment in deionized water.
- Allow equipment to air dry.

The decontamination water was maintained in 5-gallon buckets during use and transferred to 55-gallon drums for disposal. LEA field personnel were responsible for preventing cross-contamination between soil samples collected for laboratory analysis. Sample preparation tables were covered with clean, disposable plastic. Clean, disposable plastic was also laid on the ground beneath the sample preparation tables and the decontamination solutions to catch dropped soil and spilt decontamination solutions.

2.10 Monitoring Well Location Identifiers

Monitoring wells, as well as piezometers, stream gauges, surface water and sediment sampling locations, and soil borings, have been provided with location identifiers using a systematic method to prevent duplication of location identifiers. The system of location identifiers provides a relatively easy means of finding the referenced locations on site maps. All parts of the P&W East Hartford facilities, including the Andrew Willgoos Gas Turbine Laboratory, the Colt Street facility, and Main Street facility, have been divided into twenty-nine study areas. Each of the study areas has been assigned two-letter identifiers based upon the common name for the area. These two-letter designations are presented in Table 4.

In addition, each type of sampling location has been assigned a two-letter designation to identify the major sample type for a given sampling location. The two-letter designations for the various types of sampling locations are also presented in Table 4.

Because of the large areas involved, the study areas that encompass the Airport/Klondike Area include the North and South Airport Areas and the North and South Klondike Areas. All monitoring and sampling locations have been given a location identifier based on their location in the Airport/Klondike Area, the type of sampling or monitoring location, and finally a sequential numeric identifier based upon the specific type of location. The monitoring well locations are shown on Drawing 1. All of the groundwater sampling locations, including

monitoring wells, piezometers, and Geoprobe® screenpoint samples, are presented on Drawings 2 through 5 which cover the entire Airport/Klondike Area.

2.11 Waste Management

All spent decontamination fluids generated during drilling activities and purge water generated during monitoring well development activities for the investigation were placed in 55-gallon closed-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the wells contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

All soil cuttings generated during drilling activities were placed in 55-gallon open-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the wells contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

2.12 Health and Safety

LEA field personnel conducted field activities in accordance with the LEA Site Health and Safety Plan that was prepared for all of the investigation activities included on the Site. In general, well installation was conducted in modified Level D personal protective equipment (PPE) consisting of safety glasses and surgical or nitrile gloves, steel-toed shoes, and hard hats. Drilling contractors employed as subcontractors operated in accordance with their specific health and safety plans.

3. RESULTS

A total of fifty-six monitoring wells and fourteen piezometers have been installed at the Site since approximately 1980. These monitoring wells and piezometers have been installed during various environmental investigations and for various purposes. In some cases, as a substitute for permanent monitoring wells or piezometers, Geoprobe® screenpoint groundwater samples were collected.

Monitoring wells and piezometers were installed in general accordance with the procedures and practices described in the LEA SOP *Standard Operating Procedure for Monitoring Well Installation*. Changes in specific conditions, such as the depth to the water table, necessitated modifications to certain monitoring well installations and designs.

In general, fine sand packs have been deemed unnecessary due to the grain-size of the filter pack and the typically shallow depth to water. In several monitoring wells the height of the filter pack was modified from the original design due to the shallow depth to water and the need to install a sufficient bentonite seal and accommodate the construction of an adequate concrete pad.

REFERENCES

Haley & Aldrich, Inc., January, 1993, *Site-Wide Environmental Monitoring Report, Pratt & Whitney, East Hartford, Connecticut*, prepared for Pratt & Whitney.

Metcalf & Eddy, Inc. July 1993, *Draft Report - Klondike Area Site Investigation, UTC / Pratt & Whitney Facility, East Hartford, CT,* prepared for Pratt & Whitney.

Westinghouse Environmental and Geotechnical Services, Inc. November 1990, *Current Assessment Summary Report*, Pratt & Whitney, East Hartford, Connecticut, unpublished report for Pratt & Whitney.

Westinghouse Environmental and Geotechnical Services, Inc. 1990, *Preliminary Reconnaissance Survey of the Klondike Area*, Pratt & Whitney, East Hartford, Connecticut, unpublished report for Pratt & Whitney.

TABLES

Table 1
Monitoring Well Locations and Rationale
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Monitoring Well ID	Rationale/General Location
NA-MW-01	Areal coverage - North Airport
NA-MW-02	Areal coverage - North Airport
NA-MW-03	Areal coverage - North Airport
NA-MW-04	Areal coverage - North Airport
NA-MW-05	Former Pickle Company
NA-MW-06	Former Pickle Company
NA-MW-07	Former Pickle Company
NA-PZ-01	Water levels - North Airport
NA-PZ-02	Water levels - North Airport
NA-PZ-03	Water levels - North Airport
NA-PZ-04	Water levels - North Airport
NA-PZ-05	Water levels - North Airport
NA-PZ-06	Water levels - North Airport
NA-PZ-07	Water levels - North Airport
NA-PZ-08	Water levels - North Airport
NA-PZ-09	Water levels - North Airport
NA-PZ-10	Water levels - North Airport
NA-PZ-11	Water levels - North Airport
NA-PZ-12	Water levels - North Airport
NK-MW-01	Northeastern property corner
NK-MW-02	Suntan Area
NK-MW-03	Suntan Area
NK-MW-04	Suntan Area
NK-MW-05	Suntan Area
NK-MW-06	Soil storage area
NK-MW-07	Former tank farm
NK-MW-08	Former PCB Storage Building
NK-MW-09	Former PCB Storage Building
NK-MW-10	Former PCB Storage Building
NK-MW-11	Former PCB Storage Building
NK-MW-12	South of Suntan Area Access Road
NK-MW-13	X-314 Test Stand
NK-MW-14S	X-410 and X-412 Test Stands
NK-MW-15S	Western North Klondike areal coverage
NK-MW-16	X-430 through X-436 Test Stands Steel Tank Area
NK-MW-17	North Klondike Soil Piles
NK-MW-18	X-430 Test Stand

Table 1 Monitoring Well Locations and Rationale Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut	
Monitoring Well ID	**Rationale/General Location**
NK-MW-19	X-401 Test Stand
NK-PZ-01	Water levels - North Klondike
NK-PZ-02	Water levels - North Klondike
SA-MW-01	Fire Training Area
SA-MW-02I	Contractor Storage Area
SA-MW-03	Fire Training Area
SA-MW-04	Contractor Storage Area & Former Soil Stockpile
SA-MW-05I	Monitor base of aquifer at SA-WM-05S
SA-MW-05S	Contractor Storage Area
SA-PZ-01	Water levels - South Airport
SA-PZ-02	Water levels - South Airport
SK-MW-01	South Klondike Graoundwater Quality
SK-MW-02	South Klondike Graoundwater Quality
SK-MW-03	South Klondike Graoundwater Quality
SK-MW-04	South Klondike Graoundwater Quality
SK-MW-05	Virgin Product Storage Area
SK-MW-06	Fire Training Area
SK-MW-07	Chemical Storage Building in Linde Area
SK-MW-08D	Base of aquifer at SK-MW-08S
SK-MW-08S	North-South Airport Area
SK-MW-09	Stratigraphy - Eastern property corner
SK-MW-10	Stratigraphy - Eastern property corner
SK-MW-11	Quonset Hut
SK-MW-12	Fire Training Area
SK-MW-13	Southeast property corner
SK-MW-14I	Storage Yard 3
SK-MW-15I	Former drum storage area south of Cryogenics Builidng
SK-MW-16	Fire Training Area and Tie-Down Area
SK-MW-19	Virgin Product Storage Area
SK-MW-20	Virgin Product Storage Area
SK-MW-21	Virgin Product Storage Area
SK-MW-22	Virgin Product Storage Area
SK-MW-23	Virgin Product Storage Area
SK-MW-24	Virgin Product Storage Area

Table 2
Monitoring Well Construction Data Summary
Airport and Klondike Areas, Pratt & Whitney, East Hartford, Connecticut

Monitoring Well ID	Completion Date	Easting	Northing	Reference Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Base of Screen	Depth to Top of Filter Pack	Depth to Base of Filter Pack	Depth to Top of Seal	Depth to Base of Seal	Total Depth of Boring
NA-MW-01	10/11/91	183865.1	150087.8	46.09	46.31	5.30	15.30	4.30	15.30	2.30	4.30	
NA-MW-02	10/11/91	183169.3	147923.8	43.13	43.35	4.80	14.80	3.80	14.80	1.80	3.80	
NA-MW-03	10/11/91	184182.5	144746.6	43.06	43.30	4.50	14.50	3.50	14.50	1.50	3.50	
NA-MW-04	10/11/91	182454.9	146144.6	42.49	42.78	10.30	20.30	9.30	20.30	7.30	9.30	
NA-MW-05	02/20/97	184855.6	148308.3	47.91		2.25	11.25	1.25	11.25		1.25	
NA-MW-06	02/20/97	184617.2	149208.1	47.48		2.00	11.00	1.25	11.25	-2.00	1.25	
NA-MW-07	02/20/97	184335.3	147216.0	48.34		2.25	11.25	1.25	11.25		1.25	12.00
NA-PZ-01	11/13/91	183755.1	147369.5	42.72	44.11	5.00	10.00					
NA-PZ-02	11/13/91	183755.1	147369.5	43.80	44.11	5.00	10.00					
NA-PZ-03	11/13/91	182515.6	147279.1	43.19	43.49	5.00	10.00					
NA-PZ-04	11/13/91	182888.3	146907.3	41.45	41.66	5.00	10.00					
NA-PZ-05	11/13/91	183159.3	146629.3	41.32	41.59	5.00	10.00					
NA-PZ-06	11/13/91	183622.3	146232.5	40.80	41.02	5.00	10.00					
NA-PZ-07	11/13/91	183979.3	145976.8	43.67	43.94	5.00	10.00					
NA-PZ-08	11/13/91	182032.9	146148.7	40.74	40.89	5.00	10.00					
NA-PZ-09	11/13/91	182771.4	145889.8	40.48	40.76	5.00	10.00					
NA-PZ-10	11/13/91	183206.1	145538.2	43.35	43.63	5.00	10.00					
NA-PZ-11	11/13/91	183627.1	145197.7	42.19	42.48	5.00	10.00					
NA-PZ-12	11/13/91	184148.7	144778.3	43.13	43.13	5.00	10.00					
NK-MW-01	02/16/90	186195.2	148084.0	55.43	55.76	7.00	12.00	5.00	12.00	3.00	5.00	3.00
NK-MW-02	02/13/90	185325.7	147796.5	48.40	49.64	5.00	10.00	4.00	10.00	2.00	4.00	10.00
NK-MW-03	02/16/90	185362.9	148327.7	50.94	51.44	7.00	12.00	6.00	12.00	4.00	6.00	2.00
NK-MW-04	02/15/90	185331.2	148048.2	46.11	46.69	7.00	12.00	6.00	12.00	4.00	6.00	
NK-MW-05	02/13/90	184855.6	148308.3	46.65	47.70	4.00	9.00					10.00
NK-MW-06	10/01/91	184617.2	149208.1	50.57	50.76	4.00	11.50	3.00	11.50	1.00	3.00	
NK-MW-07	10/07/91	184335.3	147216.0	47.60	47.78	5.00	12.50	4.00	12.50	2.00	4.00	
NK-MW-08	10/07/92	184896.6	148429.1	50.96		4.00	11.00	3.50	11.00		3.50	11.00
NK-MW-09	10/07/92	184894.5	148385.6	50.43	50.60	4.00	11.00	3.00	11.00		3.00	11.00
NK-MW-10	10/07/92	184847.3	148392.2	49.78	49.90	3.50	10.50	2.50	11.00		2.50	11.00
NK-MW-11		184550.0	148365.0	46.75	46.75							
NK-MW-12		184223.3	147716.3	46.75		4.50	9.50					12.00
NK-MW-13		184459.3	147714.0	50.59		5.00	15.00					
NK-MW-14S		184887.7	147770.8	49.32		5.00	10.00					

Table 2
Monitoring Well Construction Data Summary
Airport and Klondike Areas, Pratt & Whitney, East Hartford, Connecticut

Monitoring Well ID	Completion Date	Easting	Northing	Reference Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Base of Screen	Depth to Top of Filter Pack	Depth to Base of Filter Pack	Depth to Top of Seal	Depth to Base of Seal	Total Depth of Boring
NK-MW-15S		186014.8	147387.9	57.49		2.00	12.00					
NK-MW-16	05/17/93	185369.3	148354.0	51.44		3.50	13.50					
NK-MW-17	07/19/96	184560.7	148863.6	49.57		4.00	9.00					15.00
NK-MW-18	07/11/96	185358.2	148289.4	47.31		1.70	10.70					15.00
NK-MW-19	07/18/96	184560.9	148244.5	46.38		1.70	10.70	0.70	10.70	-1.30	0.70	15.00
NK-PZ-01		185328.8	148368.0	46.85								
NK-PZ-02		185339.5	148319.6	46.77								
SA-MW-01	02/13/90	182912.2	144567.5	42.12	42.99	13.00	18.00					
SA-MW-02I	02/16/90	181788.5	143840.1	37.04	37.78	15.00	25.00					
SA-MW-03	10/10/91	182546.9	144407.3	40.36	40.48	10.00	20.00					
SA-MW-04	02/06/98	181919.9	143583.9	38.13	38.31	7.50	17.50					17.50
SA-MW-05I	10/09/91	182358.5	143938.4	37.81	38.65	13.50	23.50					
SA-MW-05S	10/09/91	182359.7	143932.9	38.07	38.48	4.50	14.50					
SA-PZ-01	11/13/91	181881.2	145633.8	39.56	39.76	5.00	10.00					
SA-PZ-02	11/13/91	182103.7	145507.9	40.00	40.27	5.00	10.00					
SK-MW-01	02/20/90	185636.9	144814.9	50.45	51.22	8.00	13.00					
SK-MW-02	02/22/90	185424.2	145840.4	50.18	51.30	9.00	19.00					
SK-MW-03	02/23/90	185356.5	145553.5	49.70	49.91	6.00	16.00					
SK-MW-04	02/27/90	185636.9	145226.6	50.50	50.81	5.60	15.60					
SK-MW-05	02/13/90	184770.0	145767.4	47.19	47.80	6.00	11.00					
SK-MW-06	02/14/90	184740.7	146811.2	48.43	48.80	7.00	12.00					
SK-MW-07	02/15/90	185172.4	147005.9	51.06	52.19	8.00	13.00					
SK-MW-08D	02/23/90	184537.2	145559.5	45.02	45.21	49.00	59.00	47.00	59.00	45.00	47.00	
SK-MW-08S	02/16/90	184542.3	145560.0	42.92	43.43	7.50	12.50					
SK-MW-09	10/04/91	186692.4	146766.8	63.67	64.24	5.00	15.00					
SK-MW-10	10/09/91	186235.9	145509.2	55.24	55.52	5.00	15.00					
SK-MW-11	10/07/91	185100.2	146080.8	49.58	49.77	5.00	15.00					
SK-MW-12	10/02/91	184584.6	146773.0	45.92	46.34	4.50	14.50					
SK-MW-13	10/07/91	184869.3	144540.8	42.85	43.15	2.60	12.60					
SK-MW-14I	05/17/93	184985.2	145793.7	46.85		10.00	15.00					
SK-MW-15I	05/14/93	185236.6	146418.8	49.35		10.00	15.00					
SK-MW-16	05/13/93	184352.9	146630.4	45.28		4.50	9.50					
SK-MW-19	08/29/96	184607.1	146126.0	48.99		3.50	13.50	3.50	13.50			16.00

Table 2
Monitoring Well Construction Data Summary
Airport and Klondike Areas, Pratt & Whitney, East Hartford, Connecticut

Monitoring Well ID	Completion Date	Easting	Northing	Reference Elevation	Top of Casing Elevation	Depth to Top of Screen	Depth to Base of Screen	Depth to Top of Filter Pack	Depth to Base of Filter Pack	Depth to Top of Seal	Depth to Base of Seal	Total Depth of Boring
SK-MW-20	08/29/96	184672.7	145738.3	50.05		4.00	14.00	4.00	14.00			16.00
SK-MW-21	08/29/96	184710.1	145509.0	47.86		3.50	13.50	3.50	13.50			14.00
SK-MW-22	08/29/96	184748.8	145265.4	47.44		3.00	13.00	3.00	13.00			16.00
SK-MW-23	08/26/96	184573.4	145344.2	46.39		3.00	13.00					16.00
SK-MW-24	08/26/96	184824.5	146376.8	49.15		3.00	13.00	3.00	13.00			16.00

Table 3
Soil Physical Properties Data Summary
Airport and Klondike Areas, Pratt & Whitney, East Hartford, Connecticut

Boring ID	Sample Depth	Matrix Porosity	Grain Size Distribution Parameters						
			Cu	Cc	Percent Fine Gravel	Percent Coarse Sand	Percent Medium Sand	Percent Fine Sand	Percent Silt/Clay
NK-MW-06	5' - 7'	40.6	1.8	1.1	0.0	1.2	55.3	42.1	1.4
NK-MW-07		41.8	Not Reported						
NA-SB-01	10' - 12'	37.1	1.9	0.8	0.0	3.0	53.9	42.2	0.9
SK-MW-09	14' - 16'	40.5	2.3	0.8	4.2	4.3	58.5	32.8	0.2
SK-MW-13		43.3	Not Reported						
SK-SB-10		40.3	Not Reported						
SA-MW-04		36.6	Not Reported						
SA-MW-05		39.6	Not Reported						
SA-SB-03	15' - 17'	39.2	1.6	1.6	0.0	0.1	60.4	37.4	2.1

Notes: Soil physical properties data from Haley & Aldrich, 1993

Table 4
Area and Sampling Type Identifiers
Airport and Klondike Areas, Pratt & Whitney, East Hartford, Connecticut

Area Designation	Area	Sampling Type Identifier	Explanation
AB	Within A Building	MW	Monitoring Well
BB	Within B Building	PZ	Piezometer
CB	Within C Building	SW	Surface Water
DB	Within D Building	SD	Sediment
EB	Within E Building	CC	Concrete Chip
FB	Within F Building	SS	Surface Soil
GB	Within G Building	SB	Soil Boring
HB	Within H Building		
JB	Within J Building		
KB	Within K Building		
LB	Within L Building		
MB	Within M Building		
CS	Colt Street Facility		
EA	Engineering Area		
ET	Experimental Test Airport Laboratory		
LM	Area Outside Buildings L and M		
NA	North Airport Area		
NT	North Test Area		
NW	North Willgoos Area		
PH	Powerhouse Area		
SA	South Airport Area		
SK	South Klondike Area		
ST	South Test Area		
SW	South Willgoos Area		
WT	Waste Treatment Area		
XT	Experimental Test Area		

DRAWINGS

US EPA New England
RCRA Document Management System
Image Target Sheet

RDMS Document ID # 2651

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-5

Purpose of Target Sheet:

[X] Oversized (in Site File) [ ] Oversized (in Map Drawer)

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Description of Oversized Material, if applicable:

DRAWING 1: MONITORING WELL LOCATION MAP

[X] Map [ ] Photograph [ ] Other (Specify Below)

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US EPA New England
RCRA Document Management System
Image Target Sheet

RDMS Document ID # 2651

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-5

Purpose of Target Sheet:

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Description of Oversized Material, if applicable:

DRAWING 2: NORTHWEST PORTION GROUNDWATER SAMPLING LOCATIONS

[X] Map [ ] Photograph [ ] Other (Specify Below)

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RCRA Document Management System
Image Target Sheet

RDMS Document ID # 2651

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-5

Purpose of Target Sheet:

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Description of Oversized Material, if applicable:

DRAWING 3: NORTHEAST PORTION GROUNDWATER SAMPLING LOCATIONS

[X] Map [ ] Photograph [ ] Other (Specify Below)

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US EPA New England
RCRA Document Management System
Image Target Sheet

RDMS Document ID # 2651

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-5

Purpose of Target Sheet:

[X] Oversized (in Site File) [ ] Oversized (in Map Drawer)

[ ] Page(s) Missing (Please Specify Below)

[ ] Privileged [ ] Other (Provide Purpose Below)

Description of Oversized Material, if applicable:

DRAWING 4: SOUTHWEST PORTION GROUNDWATER SAMPLING LOCATIONS

[X] Map [ ] Photograph [ ] Other (Specify Below)

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US EPA New England
RCRA Document Management System
Image Target Sheet

RDMS Document ID # 2651

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-5

Purpose of Target Sheet:

[X] Oversized (in Site File) [ ] Oversized (in Map Drawer)

[ ] Page(s) Missing (Please Specify Below)

[ ] Privileged [ ] Other (Provide Purpose Below)

Description of Oversized Material, if applicable:

DRAWING 5: SOUTHEAST PORTION GROUNDWATER SAMPLING LOCATIONS

[X] Map [ ] Photograph [ ] Other (Specify Below)

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DRAFT

ATTACHMENT A

Monitoring Well Construction Logs

NA-MW-01

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. **NA-B-01**

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 1
LOCATION N 150,088
E 183,865

ELEVATION 46.3
DATUM MDC/NGVD
START 10 October 1991
FINISH 10 October 1991
DRILLER K. Christiana
H & A REP C. Osgood

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE MOBIL B53
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0						
		2	S1	1.0		Loose dark brown loamy SILT, little roots,
		2	20	3.0	44.3	trace fine sand
		8			2.0	-SOD/FILL-
		10				Medium dense brown fine SAND, little medium sand
						-STREAM TERRACE DEPOSITS-
5		5	S2	5.0		Loose gray fine SAND, trace medium sand
		5	12	7.0		
		5				
		4				
10		3	S3	10.0		Loose brown medium to fine SAND, trace coarse sand
		3	16	12.0		
		5				
		5				-STREAM TERRACE DEPOSITS-
15		2	S4	15.0	30.8	
		2	12	17.0	15.5	Soft gray laminated silty CLAY, trace fine sand in frequent partings
		2				
		2				
		2	S5	17.0		Medium stiff gray laminated silty CLAY, trace fine sand in frequent partings
		3	24	19.0		
		2				
		2				-GLACIOLACUSTRINE-
20		3	S6	20.0		
		2	16	22.0		
		3				
		3			24.3	Same as S5
					22.0	Bottom of Exploration at 22.0 ft.
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/10/91			5.0	7.0	5.5

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	22.0
ROCK CORED (LIN FT)	--
SAMPLES	6s

BORING NO. **NA-B-01**

NA-MW-02A

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. NA-B-02

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 1
LOCATION N 147,924
E 183,169

ELEVATION 43.4
DATUM MDC/NGVD
START 11 October 1991
FINISH 11 October 1991
DRILLER K. Christiana
H & A REP C. Osgood

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	----	RIG TYPE MOBIL B53
INSIDE DIAMETER (IN)	3-3/4	1-3/8	----	BIT TYPE ----
HAMMER WEIGHT (LB)	----	140	-	DRILL MUD ----
HAMMER FALL (IN)	----	30	-	OTHER

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0						
		5	S1	1.0		Medium dense dark brown loamy SILT, some roots, trace fine sand
		5	20	3.0	41.4	
		8			2.0	-SOD/FILL-
		9				Medium dense brown medium to fine SAND (stratified)
5		3	S2	5.0		Loose rusty brown medium to fine SAND
		3	6	7.0		
		1				-STREAM TERRACE DEPOSITS-
		3				
10		3	S3	10.0		Medium dense gray medium SAND, trace coarse sand, fine sand
		5	16	12.0		
		6				-STREAM TERRACE DEPOSITS-
		7				
					28.9	
15		2	S4	15.0	14.5	Soft gray laminated silty CLAY, trace red fine sand in frequent partings
		2	12	17.0		-GLACIOLACUSTRINE-
		2				
		2				
		1	S5	17.0		Very soft gray laminated silty CLAY, trace fine sand in frequent partings
		1	24	19.0		
		1				
		1			24.4	
					19.0	Bottom of Exploration at 19.0 ft.
20						
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/11/92	1400		14.8	14.8	6.1

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	19.0
ROCK CORED (LIN FT)	----
SAMPLES	5s

BORING NO. NA-B-02

NA-MW-03

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. NA-B-03

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 1
LOCATION N 144,747
E 184,183
ELEVATION 43.3
DATUM MDC/NGVD
START 10 October 1991
FINISH 10 October 1991
DRILLER B. Ursin
H & A REP S. Gleason

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE CME75
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0						
		2	S1	1.0	41.8	-TOPSOIL-
		6	24	3.0	1.5	Loose orange brown medium to fine SAND
		6			40.8	-FILL-
		5			2.5	Medium dense gray brown silty fine SAND, trace roots
					39.3	
					4.0	
5		4	S2	5.0		Medium dense brown fine SAND, trace silt, becomes medium to fine SAND, trace coarse sand
		5	20	7.0		
		5				-STREAM TERRACE DEPOSITS-
		5				
10		2	S3	10.0		Loose brown medium to fine SAND, pockets of fine SAND
		2	24	12.0		
		6				
		6				
					28.3	
15		1	S4	15.0	15.0	Soft gray silty CLAY, medium to fine sand partings
		2	8	17.0		
		2				-GLACIOLACUSTRINE-
		2				
		1	S5	17.0		Same as S4
		WOH	8	19.0		
		1				
		1			24.3	
					19.0	Bottom of Exploration at 19.0 ft.
20						
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/10/91			5.0	7.0	5.0

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	19.0
ROCK CORED (LIN FT)	--
SAMPLES	5s

BORING NO. NA-B-03

NA-MW-04

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. **NA-B-04**

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 1
LOCATION N 146,145
E 182,455

ELEVATION 42.8
DATUM MDC/NGVD
START 10 November 1991
FINISH 10 November 1991
DRILLER B. Ursin
H & A REP S. Gleason

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE CME75
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0						
		3	S1	1.0		Loose brown medium to fine SAND, little silt
		4	23	3.0	40.8	-FILL-
		3			2.0	Loose brown loamy fine SAND
		3			40.3	-TOPSOIL-
					2.5	Loose brown medium to fine SAND
5		3	S2	5.0		Same as S1, varies to fine SAND, trace silt
		3	24	7.0		
		4				-STREAM TERRACE DEPOSITS-
		3				
10		2	S3	10.0		Same as S1, trace coarse SAND
		3	24	12.0		
		5				-STREAM TERRACE DEPOSITS-
		4				
15		3	S4	15.0		Same as S1
		4	24	17.0		
		5				
		5				
20		2	S5	20.0		Same as S1
		2	10	22.0	21.8	
		3			21.0	Medium stiff gray clayey SILT
		3				-GLACIOLACUSTRINE-
		2	S6	22.0		Same as S5, varved
		2	10	24.0		
		2				
		2			18.8	
					24.0	Bottom of Exploration at 24.0 ft.
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	DEPTH (FT) TO: BOTTOM OF HOLE	WATER
10/11/91		5.0	7.0	5.0	
10/15/91		20.5	OW	6.0	

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	24.0
ROCK CORED (LIN FT)	--
SAMPLES	6s

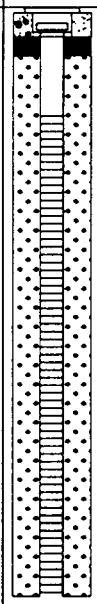
BORING NO. **NA-B-04**

MONITORING WELL COMPLETION LOG

Project: Silver Lane Pickle Add. In. **LEA Comm No:** 68V7039 **Client:** Pratt & Whitney **Location:** East Hartford	**Start Date:** 2/20/97 **End Date** 2/20/97	**Boring ID** **NA-MW-05**

Drilling Contractor: LEA
Drilling Method: Geoprobe
Sampling Method: Macro Core
Groundwater Observations:
Depth: NM **At:** **Hours**
Depth: **At:** **Hours**

Logged By: Dave Brisson
Drilling Foreman: Jon Sweeton
Drill Rig: Geoprobe 5400
Surface Elevation:
Northing:
Easting:

Elev./ Depth (Ft).	Well Construction Diagram	Sample Description Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness
0 4 8 12 16 20 24		

COVER stick up
TYPE: ~~Flush Mount~~

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: .5"
Length: 4'
Stick Up:

SEAL
Type: Bentonite
Quantity: 1/8 bag
Top Depth: Grade
Bottom Depth: 1'

SCREEN
Type: PVC Prepack Screen
Diameter: 1.5"
Slot Size: 0.010"
Top Depth: 2.25
Bottom Depth: 11.25'

FILTER PACK
Type: Native soil
Top Depth: 4.5'
Bottom Depth: 12.25

Comments:

Boring No: NA-MW-05

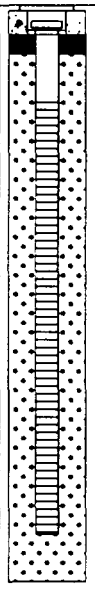
LOUREIRO ENGINEERING ASSOCIATES,PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

MONITORING WELL COMPLETION LOG

Project: Silver Lane Pickle Add. In. **LEA Comm No:** 68V7039 **Client:** Pratt & Whitney **Location:** East Hartford	**Start Date:** 2/20/97 **End Date** 2/20/97	**Boring ID** **NA-MW-06**

Drilling Contractor: LEA
Drilling Method: Geoprobe
Sampling Method: Macro Core
Groundwater Observations:
Depth: NM **At:** **Hours**
Depth: **At:** **Hours**

Logged By: Dave Brisson
Drilling Foreman: Jon Sweeton
Drill Rig: Geoprobe 5400
Surface Elevation:
Northing:
Easting:

Elev./ Depth (Ft).	Well Construction Diagram	Sample Description Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness
0 4 8 12 16 20 24		Bottom of boring

COVER stick up
TYPE: ~~Flush Mount~~

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: .5"
Length: 4'
Stick Up:

SEAL
Type: Bentonite
Quantity: 1 cup
Top Depth: Grade
Bottom Depth: 1'

SCREEN
Type: PVC Prepack Screen
Diameter: 1.5"
Slot Size: 0.010"
Top Depth: 2'
Bottom Depth: 11'

FILTER PACK
Type: Native soil, natural to
Top Depth: 4.5'
Bottom Depth: 12.25

Comments:

Boring No: NA-MW-06

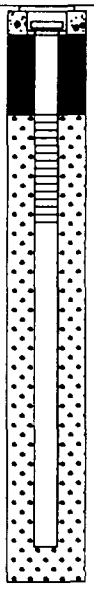
LEA
LOUREIRO ENGINEERING ASSOCIATES,PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

MONITORING WELL COMPLETION LOG

Project: Silver Lane Pickle Add. In. **LEA Comm No:** 68V7039 **Client:** Pratt & Whitney **Location:** East Hartford	**Start Date:** 2/20/97 **End Date** 2/20/97	**Boring ID** **NA-MW-07**

Drilling Contractor: LEA
Drilling Method: Geoprobe
Sampling Method: Macro Core
Groundwater Observations:
Depth: NM **At:** **Hours**
Depth: **At:** **Hours**

Logged By: Dave Brisson
Drilling Foreman: Jon Sweeton
Drill Rig: Geoprobe 5400
Surface Elevation:
Northing:
Easting:

Elev./ Depth (Ft).	Well Construction Diagram	Sample Description Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness
0		Brown, fine SAND, little very fine SAND, trace organics, moist, moderate dense
4		Top 4": Grey, brown, coarse to fine SAND, little fill material (asphalt, concrete) moist, loose; Middle 6": Orange brown, fine SAND, moist, loose; Bottom 8": Brown, fine to very fine SAND, dense, moist
		Top 6": Dark brown, very fine SAND and SILT, little organic matter, moist, dense; Bottom 14": Grey, fine SAND, trace organic matter, wet, loose
8		Top 12": As above bottom 14"; Middle 4": Grey, coarse to fine SAND, wet, loose, slight TPH odor; Bottom 4": Grey, fine SAND, wet, loose
		Grey, fine to medium SAND, wet, loose
12		As above
		Bottom of boring at 12'
16		
20		
24		

COVER STICK UP
TYPE: Flush Mount

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: .5"
Length: 4'
Stick Up:

SEAL
Type: Bentonite
Quantity: 1/8 bag
Top Depth: grade
Bottom Depth: 4.5'

SCREEN
Type: PVC Prepack Screen
Diameter: 1.5"
Slot Size: 0.010"
Top Depth: 2.25'
Bottom Depth: 11.25'

FILTER PACK
Type: Natural native soil
Top Depth: 4.5
Bottom Depth: 12

Comments: Well installed; screen 11' - 2' bags, riser 2' bags

Boring No: NA-MW-07

LEA
LOUREIRO ENGINEERING ASSOCIATES,PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

NK-MW-01

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2118 1 0 6 4

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page 1 of 1
Boring/Well No.: CAS-1
Westinghouse Job #:
Well Elevation: 55.76
Drill Forman:
Westinghouse Geologist: DUFFIN
Start Date: 2-12-90
End Date: 2-12-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-1
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER
Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	1-1.5	3-7-3		10			Medium Sand (~85% medium sand; 15% coarse sand), subrounded - subangular, well sorted, loose, moist, dark yellowish brown (10 YR/4/6), grains are dominantly quartz with about 5% mafics and heavy minerals, fluvial sand.
1.5	2	1.5-3	12-13-13		12		1.5	Coarse Sand (~90% coarse sand; 10% very coarse sand), subrounded - subangular, moderately sorted, loose, wet, dark yellowish brown (10 YR/4/4), grains are dominantly quartz with < 10% mafics and heavy minerals, fluvial sand.
3.0	3	3-4.5	5-10-18		10			
4.5	4	4.5-6	10-16-18		16			Medium - Coarse Sand; similar to above.
6.0	5	6-7.5	9-20-76		15			
7.5	6	7.5-9	100		5		7.5	Sandstone boulder, silty, medium grained sandstone, cemented, dusky red (10 R/3/4), weathered Portland Formation(?). Refusal at 7.10.
9.0	7	9-10.5	23-41-30		3			Silty, medium grained sandstone, subrounded - subangular, moderately-poorly sorted, weakly cemented, wet, dusky red (10 R/3/4), weathered Portland Formation.
10.5	8	10.5-12	21-44-120		15			Moderately cemented; less weathered.
12.0								T.D. = 12'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 12.0'
5.0' screen with .010" slots set at 7-12' depth
9.0' riser; 2.0' stickup. Quartz sand pack from 12-6' depth.
Bentonite pellets from 6-3' depth. Backfilled 3.0-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	9:00 AM	5.47'	55.76	

WESTINGHOUSE BORING NUMBER
CAS-1

Westinghouse form "BL/P1 Rev. 1 8/1/89

NK-MW-02

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
115 TOWNEY STREET, GREENFIELD, MA 01302
(508) 772-6400

Page 1 of 2
Boring/Well No.: CAS-4
Westinghouse WCC #:
Well Elevation: 46.84
Drl. Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-14-90
End Date: 2-14-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-4
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER
Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	5-3-1-1		16			Peat with organic-rich sand, soil.
								0.4
1.0								Very Fine - Medium Sand, subrounded - subangular, poorly sorted, loose, moist, very dark grayish brown (10 YR/3/2), grains are dominantly quartz; mafics and heavy minerals compose about 5%; pinkish K-feldspar (?) < 5%, soil developed in fluvial sand (?).
2.0	2	2-4	8-12-15-20		14			
3.0								Wet.
4.0	3	4-6	7-11-11-11		14			Very Fine - Fine Sand; similar to above.
5.0								
6.0	4	6-8	7-8-8-10		24			Fine - Medium Sand; similar to above.
7.0								
8.0	5	8-10	4-5-8-8		24			8.0
9.0								Medium - Coarse Sand, subrounded - subangular, moderately-well sorted, loose, wet, dark grayish brown (10 YR/4/2), grains are dominantly quartz with about 10% mafics and heavy minerals; 5% pinkish K-feldspar (?), roots and Fe-coloration throughout sample suggests soil horizonation developed in fluvial sand.

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 10.0'.
5.0' screen with .010" slots set at 10-5' depth.
7.0' riser, 2.0' stickup. Quartz sand pack from 10-4' depth.
Bentonite pellets from 4-2' depth. Backfilled 13-10'; 2.0-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	4:00 PM	4.91'	49.84	

WESTINGHOUSE BORING NUMBER: CAS-4

Westinghouse form "BL/P1 Rev. 1 8/1/89

NW-MW-02

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TENNEY STREET, GEORGETOWN, MA 01833
(508) 352-6462

Page	2 of 2
Boring/Well No.:	CAS-4
Westinghouse Job #:	
Well Elevation:	49.84
Drill Forman:	
Westinghouse Geologist:	DUFFIN
Start Date:	2-14-90
End Date:	2-14-90

Project Name	CAS
Client Name	U.T.C.
boring Location:	CAS-4
Drilling Contractor:	C. WELTI ASSOC.
Drilling Method	HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	6	10-12	3-5-5-5		24			Slightly Coarser grained than sample above; 3 mm thick purple band in middle of spoon sample (hematite (?).
11.0								
								11.8
12.0	7		2-2		12			Clay, wet, cohesive, finely laminated into varve(?) sets: silter, red laminae (10 R/4/6) alternate with clay-rich, dark gray (5 Y/4/2) laminae; lacustrine clay-silt.
13.0								T.D. = 13'
14.0								

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 10.0'
5.0' screen with .010" slots set at 10-5' depth.
7.0' riser. 2.0' stickup. Quartz sand pack from 10-4' depth.
Bentonite pellets from 4-2' depth. Backfilled 13-10'; 2.0-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	4:00 PM	4.91'	49.84	

WESTINGHOUSE BORING NUMBER: CAS-4

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NK-MW-03

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
The Tennessy Street, Operations, MA 01833
(508) 352-6462

Page 1 of 1
Boring/Well No.: CAS-7
Westinghouse Job #:
Well Elevation: 51.44
Drill Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-14-90
End Date: 2-15-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-7
Drilling Contractor: C. WELTY ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	2-3-6-8		14			
2.0	2	2-4	4-7-14-17		20			Clayey Sand, roots, soil.
4.0	3	4-6	8-18-17-21		24			4.0 Fine - Medium Sand with Clay, subangular - subrounded, moderately sorted, loose, moist, roots, dark brown (10 YR/3/3), grains are dominantly quartz with < 5% mafics and heavy minerals, soil developed in fluvial sand.
6.0	4	6-8	14-14-12-18		24			Same as above but sample lacks clay and roots; bands of hematite staining, fluvial sand.
8.0	5	8-10	6-6-8-11		24			Wet.
10.0	6	10-12	0-3-6-12					Slightly coarser grained than sample above.
12.0	7	12-14	3-4-5-8		16			12.8 Clay, wet, cohesive, finely laminated into varves (1); each varve set is ~ 1 cm thick composed of 3 distinct lamina (a silter, 1.25 mm thick, dusky red (10 R/3/4) lamina followed by a 1.25 mm thick, very pale brown (10 YR/7/4) lamina, capped by a clay-rich, 2.5 mm thick, grayish brown (2.5 Y/5/2) lamina, lacustrine clay-silt.
14.0								T.D. = 14'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
2" Well Point at 12.0'.
5.0' screen with .010" slots set at 12-7' depth.
9.0' riser, 2.0' stickup. Quartz sand pack from 12-5' depth.
Bentonite pellets from 5-3' depth. Backfilled from 14-12'; 3-0'.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	12:30 PM	8.35'	51.44	

WESTINGHOUSE BORING NUMBER: CAS-7

Westinghouse form "BL/P1 Rev. 1 8/1/88

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NK-MW-04

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TENNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page	1 of 1
Boring/Well No.:	CAS-8
Westinghouse Job #:	
Well Elevation:	46.69
Drill Foreman:	
Westinghouse Geologist:	DUFFIN
Start Date:	2-15-90
End Date:	2-15-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-8
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	0-23-12-14		12			Asphalt (parking lot) and fill.
							0.8	Fine - Medium Sand, subangular - subrounded, moderately sorted, loose, moist, brown (10 YR/4/3), grains are dominantly quartz with < 5% mafics and heavy minerals, fluvial sand.
2.0	2	2-4	18-24-23-33		16			
4.0	3	4-6	14-13-12-10		22			
							8.0	Medium - Coarse Sand, subangular - subrounded, moderately-well sorted, loose, wet, some orange hematite staining, brown (10 YR/4/3), grains are dominantly quartz with < 5% mafics and heavy minerals, fluvial sand.
6.0	4	6-8	2-3-12-15		22			
8.0	5	8-10	0-3-6-8		20			
10.0	6	10-12	2-6-6-8		24			More mafics and heavy minerals.
							11.8	Clay, wet, cohesive.
12.0								T.D. = 12'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

NOTES:
2" Well Point at 12.0'
5.0' screen with .010" slots set at 12-7' depth
6.5' riser. Quartz sand pack from 12-5' depth.
Bentonite pellets from 5-3' depth. Backfilled 3.0-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90		1.92'	46.69	

WESTINGHOUSE BORING NUMBER: CAS-8

QA/QC CHECKED BY:

Westinghouse form "BL/P1 Rev. 1 8/1/89

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WK-MW-05

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TERMEY STREET, GEORGETOWN, MA 01833
(508) 352-6432

Page	1 of 1
Boring/Well No.:	CAS-3
Westinghouse Job #:	
Well Elevation:	47.67
Drill Forman:	
Westinghouse Geologist:	DUFFIN
Start Date:	2-13-90
End Date:	2-13-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-3
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER — Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From: / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	1-4-8-10		23			Fine - Medium Sand, subrounded - subangular, moderately well sorted, loose, moist, grayish brown (2.5 Y/5/2), grains are dominantly quartz with < 5% mafics and heavy minerals, fluvial sand.
2.0	2	2-4	10-14-14-14		21			Mafics and heavy minerals more common.
							3.0	
4.0	3	4-6	8-9-12-13		19			Medium - Coarse Sand, subrounded - subangular, moderately sorted, loose, moist, dark grayish brown (10 YR/4/2), grains are about 80% quartz with 10% mafics and heavy minerals and 10% pink-red K-feldspar (?), fluvial sand.
6.0	4	6-8	10-12-12-13		24			Slightly coarser than above. Wet
8.0	5	8-10	6-6-6-5		24			
							8.0	Clay, wet, cohesive, finely laminated into varve (?) sets: ~3 mm dark gray laminae (5 Y/4/1) alternates with ~2 mm thick gray laminae (5 Y/5/1); thicker laminae is silter, lacustrine clay. T.D. = 10'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 12.0'
5.0' screen with .010" slots set at 9-4' depth
8.0' riser; 2.0' stickup. Quartz sand pack from 9-2' depth.
Bentonite pellets from 2-1' depth. Backfilled 1.0-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	10:00 AM	7.08'	47.67	

WESTINGHOUSE BORING NUMBER: CAS-3

Westinghouse form "BL/P1 Rev. 1 8/1/89

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. NK-MW-06

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 1
LOCATION N 149,208
E 184,617
ELEVATION 49.0
DATUM MDC/NGVD
START 1 October 1991
FINISH 1 October 1991
DRILLER B. Ursin
H & A REP C. Osgood

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE CME75
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0						
		6	S1	1.0		Medium dense brown medium to fine SAND, little fine gravel
		13	18	3.0		
		8				
		9			46.0	-FILL-
					3.0	
5		6	S2	5.0		Medium dense red-brown medium SAND, trace fine sand
		7	10	7.0		
		6				
		8				-STREAM TERRACE DEPOSITS
10		2	S3	10.0		Very loose red-brown medium SAND
		2	10	12.0		
		1			37.5	
		2			11.5	
		3	S4	12.0		Very soft red-gray laminated silty CLAY, trace fine sand in frequent partings
		2	14	14.0		-GLACIOLACUSTRINE-
		2				
		3				
		2	S5	14.0		Very soft gray laminated silty CLAY, trace fine sand in frequent partings
15		2	11	16.0		-GLACIOLACUSTRINE-
		2				
		2			33.0	
					16.0	Bottom of Exploration at 16.0 ft.
						Note: Observation well installed at 11.5 ft.
20						
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/1/91	1300		10.0	11.9	5.4

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	16.0
ROCK CORED (LIN FT)	--
SAMPLES	5s

BORING NO. NK-MW-06

NK-MW-07

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. NK-MW-07

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 1
LOCATION N 147,216
E 184,335

ELEVATION 46.0
DATUM MDC/NGVD
START 7 October 1991
FINISH 7 October 1991
DRILLER B. Ursin
H & A REP C. Osgood

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE CME75
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0						
		10	S1	1.0		Dense brown silty fine SAND, some gravel,
		21	20	3.0		trace coarse to medium sand
		14			43.5	-FILL-
		6			2.5	Medium dense dark brown fine SAND, trace silt
5		1	S2	5.0		Very loose gray-brown fine SAND, little medium
		1	24	7.0		sand
		2				-STREAM TERRACE DEPOSITS-
		2				
10		2	S3	10.0		Loose gray medium to fine SAND
		3	24	12.0		
		4			34.5	
		4			11.5	Medium stiff gray laminated silty CLAY
		1	S4	12.0		Very soft gray laminated silty CLAY, trace
		1	24	14.0		fine sand in frequent partings.
		1				-GLACIOLACUSTRINE-
		1				
		1	S5	14.0		
15		1	24	16.0		Very soft gray laminated silty CLAY
		1				
		1			30.0	
					16.0	Bottom of Exploration at 16.0 ft.
						Note: Observation well installed at 11.5 ft.
20						
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/7/91	1030		10.0	11.4	8.4
10/7/91	1430		12.5	12.5	8.1

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	16.0
ROCK CORED (LIN FT)	--
SAMPLES	5s

BORING NO. NK-MW-07

MONITORING WELL COMPLETION LOG

Project: X-430 Area **LEA Comm No:** 68TR653 **Client:** Pratt & Whitney **Location:** East Hartford, CT	**Start Date:** 07/11/96 **End Date** 07/11/96	**Boring ID** **NK-MW-18**

Drilling Contractor: LEA
Drilling Method: Geoprobe
Sampling Method: Large Bore
Groundwater Observations:
Depth: NM **At:** **Hours**
Depth: **At:** **Hours**

Logged By: L. Bianchi
Drilling Foreman: J. Sweeton
Drill Rig: Geoprobe 5400
Surface Elevation:
Northing:
Easting:

Elev./ Depth (Ft).	Well Construction Diagram	Sample Description Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness
0		Dark brown black, fine SAND, some Silt, little medium SAND, trace(-) coarse Sand, moist, moderately loose, roots
		6": As Above; 17": Brown, medium SAND and fine SAND, some coarse Sand, little Silt, trace(-) fine Gravel, loose, wet at approximately 3.0' - 3.5'
4		As Above; slight hydrocarbon odor
		19": Reddish brown, fine SAND and SILT, slightly stiff, slight hydrocarbon odor, wt; 4": Dark brown, medium SAND, some fine Sand, little coarse Sand, trace(+) Silt, trace(-) fine Gravel, loose, wet
8		As Above
		17": As Above; 6": Olive grey, varved CLAY, trace(+) Silt, trace(-) fine Sand, stiff, wet
12		As Above
		As Above
16		Bottom of Boring at 15.0'
20		
24		

COVER
TYPE: Flush Mount

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: 0.5"
Length: 1.7'
Stick Up:

SEAL
Type: Med.Bent.Chips
Quantity: 1/4 bag
Top Depth: 0.5'
Bottom Depth: 1.0'

SCREEN
Type: See Comments
Diameter: As Above
Slot Size: 0.01"
Top Depth: 1.7'
Bottom Depth: 10.7'

FILTER PACK
Type: 20/40 Sand
Top Depth: 1.0'
Bottom Depth: 11.7'

Comments: Screen consists of stainless steel wire mesh of 1.5" O.D. internally prepacked with 20/40 silica sand and a inside Schedule 80 PVC screen of 0.5" I.D.; Borehole collapsed from bottom of boring to 11.7 feet. Borehole backfilled with bentonite.

Boring No: NK-MW-18

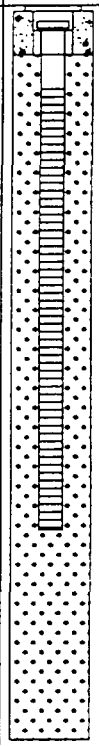
LEA
LOUREIRO ENGINEERING ASSOCIATES,P.C.
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

MONITORING WELL COMPLETION LOG

Project: X401 Area **LEA Comm No:** 68TR656 **Client:** Pratt & Whitney **Location:** East Hartford, CT	**Start Date:** 7/18/96 **End Date** 7/18/96	**Boring ID** **NK-MW-19**

Drilling Contractor: LEA
Drilling Method: Geoprobe
Sampling Method: Large Bore
Groundwater Observations:
Depth: NM **At:** **Hours**
Depth: **At:** **Hours**

Logged By: L. Bianchi
Drilling Foreman: J. Sweeton
Drill Rig: Geoprobe 5400
Surface Elevation:
Northing:
Easting:

Elev./ Depth (Ft).	Well Construction Diagram	Sample Description Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness
0		5": Dark brown, fine SAND some Silt, little medium Sand, trace(-) coarse Sand, moist, slightly loose; 18": Light yellowish brown, medium Sand, some fine Sand, little coarse Sand, trace Silt, moist, loose
		As Above; wet at 3.5'
4		9": As Above; 10": Dark greyish brown, fine SAND wilt Silt, trace medium Sand, wet, slightly dense
		7": As Above; 12": greyish/brown, medium SAND with fine Sand, some coarse Sand, trace(+) fine Gravel, trace(-) Silt, wet, loose
8		5": As Above; 18": Greyish brown, fine SAND, with Silt, trace medium Sand, wet, slightly loose
		10": As Above; 13": Olive grey, varved CLAY, trace(+) Silt, trace(-) fine Sand, wet, stiff
12		As Above
		As Above
16		Bottom of Boring at 15.0'
20		
24		

COVER
TYPE: Flush Mount

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: 0.5"
Length: 1.7'
Stick Up:

SEAL
Type: Med. Bent. Chip
Quantity: 1/4 bag
Top Depth: 0.5'
Bottom Depth: 1.0'

SCREEN
Type: See Comments
Diameter: As Above
Slot Size: 0.01"
Top Depth: 1.7'
Bottom Depth: 10.7'

FILTER PACK
Type: 20/40 Sand
Top Depth: 1.0'
Bottom Depth: 11.7'

Comments: Screen consists of stainless steel wire mesh of 1.5" O.D. internally prepacked with 20/40 silica sand and an inside Schedule 80 PVC screen of 0.5" I.D.; Borehole collapsed from bottom of boring to 11.7 feet.

Boring No: NK-MW-19

LEA
LOUREIRO ENGINEERING ASSOCIATES,PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

SA-MW-01

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2118 - 0050

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNEY STREET, GEORGETOWN, MA 01833
(508) 352-6432

Boring/Well No. CAS-2
Westinghouse Job #
Well Elevation: 42.69
Grid Ref.:
Westinghouse Geologist: DUFFIN
Start Date: 2-12-90
End Date: 2-13-90

Project Name: CAS
Client Name: UTC
Boring Location: CAS-2
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	1-1.5	14-40-23		4			
1.5	2	1.5-3	20-15-10		0			Sandy material with pebble-size rock fragments, fill.
3.0	3	3-4.5	6-5-3		6			Cobble-size piece of material jammed tube.
4.5	4	4.5-6	8-12-15		15			4.5 Fine - Medium Sand, subrounded - subangular, moderately sorted, loose, moist, dark yellowish brown (10 YR/4/4), grains are dominantly quartz, fluvial sand.
6.0	5	6-7.5	8-14-14		14			6.0 Medium - Coarse Sand (~95% medium-coarse sand; 5% very coarse-granular sand), subrounded - subangular, moderately-poorly sorted, loose, moist, dark yellowish brown (10 YR/3/4), grains are dominantly quartz with < 5% mafics and heavy minerals, fluvial sand.
7.5	6	7.5-9	5-12-18		18			
9.0	7	9-10.5	5-10-14					Slightly Coarser than above, wet, mafics increase to 10%
10.5	8	10.5-12.5	9-3-3-11		19			Slightly finer; less mafics.
12.5	9	12.5-14.5	8-10-9-14		20			12.5 "Flowing Sand": Fine - Medium Sand, subrounded - subangular, moderately-well sorted, loose, wet, brown (10 YR/11/3), grains are dominantly quartz, mafics and heavy minerals compose < 10%, fluvial sand.
14.5	10	14.5-16.5	7-14-13-14		21			

GRANULAR SOILS Blows/Ft	Density	COHESIVE SOILS Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 30	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
2" Well Point at 18.0'
5.0' screen with .010" slots set at 13-18' depth
9.0' riser; 2.0' stickup. Quartz sand pack from 18-10.5' depth.
Bentonite pellets from 10.5-8' depth. Backfilled 8.0-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	6:00 PM	9.73'	42.69	

WESTINGHOUSE BORING NUMBER: CAS-2

Westinghouse form "BL/P1 Rev. 1 8/1/88

SA-MW-01

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNEY STREET, COHASSET, MA 01938
(508) 383-6492

Page: 2 of 2
Boring/Well No.: CAS-2
Westinghouse Job #:
Well Elevation: 42.99
Drill Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-12-90
End Date: 2-13-90

Project Name: CAS
Client Name: UTC
Boring Location: CAS-2
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER
Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	11	18.5–18.5	0–10–15–12		18			"Flowing" Sand – No Sample.
18.5		18.5–20	NO SAMPLE		0			20.0
								Medium – Coarse Sand, surrounded – subangular, moderately sorted, loose, wet, brown (10 YR/4/3), grains are dominantly quartz; mafics compose < 5%. fluvial sand.
20.5	12	20–20.5						20.5
	13		0–2–2–3		23			Silty Clay, wet, cohesive, laminations range in thickness from < 1 mm – 1 cm (some suggest silt-clay varves); some soft sediment deformation, olive-gray (5 Y/4/2); lacustrine clay.
								T.D. = 22'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 – 4	v. loose	< 2	v. soft
4 – 10	loose	2 – 4	soft
10 – 30	m. dense	4 – 8	m. stiff
30 – 50	dense	8 – 15	stiff
> 50	v. dense	15 – 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 18.0'
5.0' screen with .010" slots set at 13–18' depth
8.0' riser; 2.0' stickup. Quartz sand pack from 18–10.5' depth.
Bentonite pellets from 10.5–8' depth. Backfilled 8.0–0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	8:00 PM	9.73'	42.99	

WESTINGHOUSE BORING NUMBER: CAS-2

Westinghouse form "BL/P1 Rev. 1 8/1/89

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SA-MW-02

CONFIDENTIAL

2118 1 0 0 1

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page: 1 of 2
Boring/Well No.: CAS-11
Westinghouse Job #:
Well Elevation: 37.78
Drill Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-16-90
End Date: 2-16-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-11
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER
Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	4-7-4-4		8			
2.0	2	2-4	2-3-5-6					Clayey Sand, roots, soil or fill.
4.0	3	4-6	5-6-8-8		12			4.0 — Medium Sand (coarse sand composes about 15%), subangular - subrounded, moderately-well sorted, loose, moist, dark yellowish brown (10 YR/4/8), grains are dominantly quartz with about 5% mafics, fluvial sand.
6.0	4	6-8	7-7-7-7		18			Same as above except contains slightly more mafics.
8.0	5	8-10	4-6-6-7		- -			Same as above except is wet.
10.0	6	10-12	3-5-7-10		14			Slightly coarser-grained than sample above.
12.0	7	12-14	7-8-14-13					
14.0	8	14-16	3-7-13-15		24			14.0 — Medium - Coarse Sand, subangular - subrounded, moderately sorted, loose, wet, brown (10 YR/4/3), grains are dominantly quartz with about 10% mafics and heavy minerals, fluvial sand.
16.0	9	16-18	10-4-4-7		24			Slightly coarser grained than sample above.
18.0	10	18-20	3-2-1-3					

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 25.0'
10.0' screen with .010" slots set at 25-15' depth.
17.0' riser. 2.0' stickup. Quartz sand pack from 25-13' depth.
Bentonite pellets from 13-11' depth. Backfilled 11.0-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	6:30 PM	12.25	37.78	

WESTINGHOUSE BORING NUMBER: CAS-11

Westinghouse form "BL/P1 Rev. 1 8/1/89

SA-MW-02

CONFIDENTIAL

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TOWNSEY STREET, GEORGETOWN, MA 01833
(508) 352-6482

Page 2 of 2
Boring/Well No.: CAS-11
Westinghouse Job #:
Well Elevation: 37.78
Drill Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-16-90
End Date: 2-16-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-11
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	11	20-22	8-6-10-11		19			
22.0	12	22-24	0-5-8-13		24			
24.0	13	24-26	5-7-9-15		24			
							25.8	Very Fine Sand, subangular, moderately sorted, loose, wet, olive gray (5 Y/5/2), lacustrine sand (?).
26.0	14	26-28	13-15-17-20		8			
							28.0	Clay - Silt, wet, fairly cohesive, dark olive gray (5 Y/3/2), no sedimentary structures visible, lacustrine clay-silt.
28.0	15	28-30	3-5-5-7		12			T.D. = 30'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 25.0'
10.0' screen with .010" slots set at 25-15' depth.
17.0' riser, 2.0' stickup. Quartz sand pack from 25-13' depth.
Bentonite pellets from 13-11' depth. Backfilled 11.0-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	6:30 PM	12.25	37.78	

WESTINGHOUSE BORING NUMBER: CAS-11

Westinghouse form "BL/P1 Rev. 1 8/1/89

2118 1-00-00

SA-MW-03

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SA-B-03

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 2
LOCATION N 144,407
E 182,547

ELEVATION 38.9
DATUM MDC/NGVD
START 9 October 1991
FINISH 9 October 1991
DRILLER K. Christiana
H & A REP S. Osgood

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE MOBIL B53
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0					37.9	Gray brown fine SAND, trace roots, silt and wood
		5	S1	1.0	1.0	-FILL-
		5	12	3.0		Medium dense brown fine SAND, little silt, trace loam
		7				-STREAM TERRACE DEPOSITS-
		6				
5		3	S2	5.0		Loose brown fine SAN[
		3	19	7.0		
		4			32.4	
		5			6.5	Loose brown medium SAND, little fine sand
						-STREAM TERRACE DEPOSITS-
10		4	S3	10.0		Medium dense brown medium SAND, trace fine sand
		6	10	12.0		
		10				
		12				
15		4	S4	15.0		Medium dense brown medium SAND, trace fine sand
		7	24	17.0		
		7				
		7				-STREAM TERRACE DEPOSITS-
20		7	S5	20.0		Medium dense brown medium to fine SAND
		6	11	22.0		
		5				
		7				
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/9/91	1415		20.0	21.1	6.1
10/10/91	0815		20.0	20.0	8.6
10/10/91	1130		20.0	20.0	12.6

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	31.0
ROCK CORED (LIN FT)	--
SAMPLES	8s

BORING NO. SA-B-03

SA-MW-03

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SA-B-03
FILE NO. 90358-40
SHEET NO. 2 of 2

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
25		1	S6	25.0		Medium dense brown medium to fine SAND
		2	12	27.0		
		3			12.4	
		5			26.5	Stiff gray laminated silty CLAY, trace fine sand
		3	S7	27.0		
		2	15	29.0		Stiff gray laminated silty CLAY, trace fine sand in frequent partings
		6				
		5				-GLACIOLACUSTRINE-
		2	S8	29.0		
30		2	16	31.0		Soft gray laminated silty CLAY, trace fine sand in frequent partings
		2				
		2			7.9	
					31.0	Bottom of Exploration at 31.0 ft.
35						
40						
45						
50						
55						
60						

SA-MW-04

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SA-MW-04

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 2
LOCATION N 143,584
E 181,920

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE CME75
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

ELEVATION 36.3
DATUM MDC/NGVD
START 7 October 1991
FINISH 8 October 1991
DRILLER B. Ursin
H & A REP C. Osgood

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0					35.3	Visible in borehole: Brown gravelly coarse to fine SAND, trace asphalt, roots
		4	S1	1.0	1.0	-FILL-
		4	24	3.0		Loose brown medium to fine SAND, trace silt
		3				
		3				
5		4	S2	5.0		Loose brown medium to fine SAND
		4	12	7.0		
		3				
		3				-STREAM TERRACE DEPOSITS-
10		3	S3	10.0		Loose brown medium to fine SAND, trace coarse sand
		4	17	12.0		
		3				
		3				
15		4	S4	15.0		Loose brown medium SAND, little coarse sand, fine sand
		3	18	17.0		
		4				
		7				-STREAM TERRACE DEPOSITS-
20		2	S5	20.0		Very loose brown medium SAND, little coarse sand, trace fine sand
		1	15	22.0		
		2				
		4				
		4	S6	24.0		Loose brown medium SAND, little coarse sand
25		4	24	26.0	11.3	

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/7/91	1530		24.0	25.5	9.3
10/8/91	0730		23.0	21.0	9.1

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	30.0
ROCK CORED (LIN FT)	--
SAMPLES	8s

BORING NO. SA-MW-04

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SA-MW-04
FILE NO. 90358-40
SHEET NO. 2 of 2

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
25		4			25.0	Loose gray laminated fine sandy SILT
		6				
		12	S7	26.0		Loose gray laminated silty fine SAND
		14	14	28.0		
		21				-GLACIOLACUSTRINE-
		33			8.3	
		2	S8	28.0	28.0	Loose gray laminated clayey SILT, some fine sand
		2	16	30.0		
		3				
30		3			6.3	
					30.0	Bottom of Exploration at 30.0 ft.
35						
40						
45						
50						
55						
60						

BORING NO. SA-MW-04

SA-MW-05

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SA-B-05

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 2
LOCATION N 143,933
E 182,360
ELEVATION 36.7
DATUM MDC/NGVD
START 8 October 1991
FINISH 8 October 1991
DRILLER B. Ursin
H & A REP S. Gleason

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE CME75
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0					35.7	-TOPSOIL-
		3	S1	1.0	1.0	Loose brown medium to fine SAND, some areas
		3	24	3.0		trace silt
		3				
		3				
5			S2	5.0		Same as S1
			24	7.0		
						-STREAM TERRACE DEPOSITS-
10			S3	10.0		Same as S1
			24	12.0		
15			S4	15.0		Brown coarse to fine SAND, trace fine gravel
			24	17.0		
						-STREAM TERRACE DEPOSITS-
20		3	S5	20.0		Same as S4
		3	24	22.0		
		3			15.2	
		3			21.5	
		3	S6	22.0		Medium stiff gray silty fine SAND
		4	24	24.0	13.7	
		3			23.0	
		4				
		1	S7	24.0		Soft gray fine sandy SILT, trace to little
25		1	12	26.0	11.7	clay

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/8/91			10.0	12.0	8.0

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	30.0
ROCK CORED (LIN FT)	--
SAMPLES	9s

BORING NO. SA-B-05

SA-MW-05

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SA-B-05
FILE NO. 90358-40
SHEET NO. 2 of 2

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
25		2			25.0	
		2				
		1	S8	26.0		Same as S7, varies to silty clay
		1	15	28.0		
		1				-GLACIOLACUSTRINE-
		1				
		2	S9	28.0		Soft gray varved silty CLAY
		2	18	30.0		
		1				
30		2			6.7	
					30.0	Bottom of Exploration at 30.0 ft.
35						
40						
45						
50						
55						
60						

BORING NO. SA-B-05

SK-MW-01

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
113 TOWNEY STREET, CHELSEA, MA 01833
(508) 381-6466

Page 1 of 3
Boring/Well No.: CW-1
Westinghouse Job #:
Well Elevation: 51.22
Drill Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-19-90
End Date: 2-20-90

Project Name: SITE ASSESSMENT
Client Name: U.T.C.
Boring Location: CW-1
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER
Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
2.5								Fine Sand (~90% fine sand; 10% medium sand), subrounded – subangular, well sorted, loose, moist, dark brown (7.5 YR/3/4), dominantly quartz grains with ~2% mafics and heavy minerals, soil formed in fluvial sand.
5.0	1	5–7	7–10–13–17		24			5.0
7.5								Medium Sand (~70% medium; ~30% coarse sand), subrounded – subangular, well to moderately sorted, loose, wet, dark brown (7.5 YR/3/4), dominantly quartz grains with < 10% mafics and heavy minerals, fluvial sand.
10.0	2	10–12	11–6–7–11		24			10.0
12.5								Medium – Coarse Sand (~80% medium–coarse sand; 8% very coarse sand; 2% granular sand), subrounded – subangular, moderately sorted, loose, wet, dark brown (7.5 YR/3/4), dominantly quartz grains with ~12% mafics and heavy minerals, fluvial sand.
15.0	3	15–17	5–5–5–6		24			15.0
17.5								Slightly coarser sand than above.
20.0	4	20–22	2" TUBE		24			16.0
22.5								Clay, wet, cohesive, finely laminated, [grayish to dark grayish brown (10 YR/4–5/2) < 1 cm thick laminations alternate with weak red (10 R/4/4) laminations], laminations are as fine as < 1 mm, lacustrine clay.

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 – 4	v. loose	< 2	v. soft
4 – 10	loose	2 – 4	soft
10 – 30	m. dense	4 – 8	m. stiff
30 – 50	dense	8 – 15	stiff
> 50	v. dense	15 – 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
Pumped grout from bottom to top of hole.
No well installed.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
2-19-90		5.5'	51.22	

WESTINGHOUSE BORING NUMBER: CW-1

Westinghouse form "BL/P1 Rev. 1 8/1/89

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNPIKE STREET, CANTON, MA 02021
(617) 828-8440

Page	2 of 3
boring/well No.:	CW-1
Westinghouse Job #:	
Well Elevation:	51.22
Drill Foreman:	
Westinghouse Geologist:	DUFFIN
Start Date:	2-19-90
End Date:	2-20-90

Project Name: SITE ASSESSMENT
Client Name: UTC
Boring Location: CW-1
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER — Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
25.0	5	25-27	WOR		24			
27.5								
30.0	6	30-32	0-0-0-1		24			
32.5								Lacustrine clay - continued
35.0	7	35-37	0-0-2-2		24			
37.5								
40.0	8	40-42	0-1-2-4		24			
42.5								
45.0	9	45-47	0-0-3-4		24			

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
Pumped grout from bottom to top of hole.
No well installed.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
2-19-90		5.5'	51.22	

WESTINGHOUSE BORING NUMBER: CW-1

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SK-MW-01

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TENNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page: 3 of 3
Boring/Well No.: CW-1
Westinghouse Job #:
Elevation: 51.22
Drill Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-19-90
End Date: 2-20-90

Project Name: SITE ASSESSMENT
Client Name: U.T.C.
Boring Location: CW-1
Drilling Contractor: C. MELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
47.5								Lacustrine clay - continued
50.0	10	50-52	0-0-2-3					
52.5								53.0
55.0	11	55-57	21-23-20-10					Sand and rock fragments in a matrix of silt and clay (grains and rock fragments compose about 60%; clay and silt about 40%), wet, friable, dark reddish brown (5 YR/3/3), till
57.5								
60.0								Auger Refusal at 58.0' T.D. = 58.0'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

GA/GC CHECKED BY:

NOTES:

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
2-19-90		5.5'	51.22	

WESTINGHOUSE BORING NUMBER: CW-1

Westinghouse form "BL/P1 Rev. 1 8/1/89

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SK-MW-02

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TENNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Project Name:	SITE ASSESSMENT	Sheet	1 of 1
Client Name:	U.T.C.	Boring/Well No.:	CW-3
Boring Location:	CW-3	Westinghouse Job #:	
Drilling Contractor:	C. WELTI ASSOC.	Well Elevation:	51.30
Drilling Method:	HOLLOW STEM AUGER Auger Size: 3.75" ID	Drill Foreman:	
		Westinghouse Geologist:	LANG
		Start Date:	2-22-90
		End Date:	2-22-90

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From - To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
								Silty Sand with peat.
							2.0	
2.5			AUGERED DOWN NO SPOON					
5.0	1	5-7	3-4-13-15		14			Fine Sand, subangular, moderately sorted, grey-brown, small pockets of orange stain.
7.5								
10.0	2	10-12	9-8-8-11		20		10.0	Fine - Medium Sand, poorly sorted, wet, pinkish-brown, no odor.
12.5								
15.0	3	15-16.5	7-8-8		20			Medium Sand, some coarse sand, wet, reddish brown.
17.5								
20.0	4	20-21.5	1-2-2		4		20.0	Silt-clay, wet, reddish brown. T.D. = 21.5'
22.5								

GRANULAR SOILS Blows/Ft	Density	COHESIVE SOILS Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
2" Well point at 19.0'
10.0' screen with .010" slots set at 19-9' depth.
10.0' riser, 1.0' stickup. Quartz sand pack from 19-7.5' depth.
Bentonite pellets from 7.5-5.5' depth. Backfilled (5.5-0').

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
2-22-90	2:30 PM	4.0'	51.30	

WESTINGHOUSE BORING NUMBER: CW-3

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNEY STREET, GEORGETOWN, MA 01833
(508) 352-6432

Page	1 of 1
Boring/Well No.:	CW-4
Westinghouse Job #:	
Well Elevation:	49.91'
Drill Foreman:	
Westinghouse Geologist:	DUFFIN
Start Date:	2-23-90
End Date:	2-23-90

Project Name: SITE ASSESSMENT
Client No.: U.T.C.
Boring Location: CW-4
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER — Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	1-0-2-3		12			Peat with roots.
								0.3
2.5								Silty Fine - Very Fine Sand (~80% sand; 20% silt and clay), subrounded - subangular, moderately-poorly sorted, loose, wet, brown (7.5 YR/4/4), grains are dominantly quartz, soil developed in fluvial sand.
								5.0
5.0	2	5-7	10-10-11-14		18			Slightly coarser sand than above.
7.5								
								10.0
10.0	3	10-12	5-3-6-10		24			Medium - Coarse Sand (~80% fine sand; ~20% very fine sand and silt), subrounded - subangular moderately-poorly sorted, loose, wet, dark grayish brown (10 YR/4/2), dominantly quartz grains with ~10% mafics and heavy minerals, cross-bedded, some orange hematite stained horizons, fluvial sand.
12.5								
15.0	4	15-17	3-3-3-4		6			"Running" Sand at 15'.
								16.8
17.5								Clay, wet, cohesive, dark grayish brown (2.5 Y/4/2).
								T.D. = 17.0'
20.0								

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
2" Well point at 18.0'
10.0' screen with .010" slots set from 18-6' depth; 6.0' riser; 2.0' stickup
Quartz Sand Pack (16-4'); Bentonite pellets (4-2').

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
2-23-90	11:00 AM	2.0'	49.91	

WESTINGHOUSE BORING NUMBER: CW-4

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2118 - 0072

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TENNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page: 1 of 2
Boring/Well No.: CW-5
Westinghouse Job #:
Well Elevation: 50.81
Drl. Foreman:
Westinghouse Geologist: LANG
Start Date: 2-26-90
End Date: 2-27-90

Project Name: SITE ASSESSMENT
Client Name: U.T.C.
Boring Location: CW-5
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
2.5								Medium Sand, subrounded, moderately sorted, wet, reddish brown.
5.0	1	5–7	9–14–14–17		24			
7.5								
10.0	2	10–12	11–14–15–9		20			Reddish band at 11'.
12.5								
15.0	3	15–17						"Running" sand at 15'.
								18.0
17.5								Clay–silt, wet, cohesive, laminated, brown.
20.0	4	20–22	2–1–2–1		24			
22.5								

GRANULAR SOILS

Blows/Ft	Density
0 – 4	v. loose
4 – 10	loose
10 – 30	m. dense
30 – 50	dense
> 50	v. dense

COHESIVE SOILS

Blows/Ft	Density
< 2	v. soft
2 – 4	soft
4 – 8	m. stiff
8 – 15	stiff
15 – 30	v. stiff
> 30	hard

NOTES:

No monitoring well installed.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
2-27-90		2.0'	50.81	

WESTINGHOUSE BORING NUMBER: CW-5

QA/QC CHECKED BY:

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TOWNSEND STREET, GEORGETOWN, MA 01833
(508) 352-6481

Page: 2 of 3
Boring/Well No.: CW-5
Westinghouse Job #:
Well Elevation: 50.81
Grid Formula:
Westinghouse Geologist: LANG
Start Date: 2-26-90
End Date: 2-27-90

Project Name: SITE ASSESSMENT
Client Name: U.T.C.
Boring Location: CW-5
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER
Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From | To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	5	25-27	2" TUBE		24			
27.5								
30.0	6	30-32	3-2-2-2		24			
32.5								
35.0	7	35-37	1-2-3-3		24			Clay-silt unit - continued
37.5								
40.0	8	40-42	2-2-4-5		24			
42.5								
45.0	9	45-47	14-20-16-15		24			46.8
47.5								Medium Sand with granules in a silty sand matrix, wet, well cemented, red-brown, till. Auger Refusal at 48.0'

GRANULAR SOILS Blows/Ft	Density	COHESIVE SOILS Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
No monitoring well installed.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
2-27-90		2.0'	50.8'	

WESTINGHOUSE BORING NUMBER: CW-5

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page 1 of 2
Boring/Well No.: CAS-5
Westinghouse Job #:
Well Elevation: 47.80
Drill Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-13-90
End Date: 2-13-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-5
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	3-5-9-12		18			Peat, soil. 0.4
1.0								Clayey Very Fine Sand-Silt, subangular, poorly sorted, loose, moist, very dark grayish brown (10 YR/4/2), soil developed in fluvial sand or till (?).
2.0	2	2-4	10-20-20-18		13			Slightly coarser-grained than above.
3.0								
4.0	3	4-6	7-11-11-12		22			4.0 Fine - Medium Sand, subangular - subrounded, moderately sorted, loose, wet, dark grayish brown (10 YR/4/2), grains are dominantly quartz with about 10%-15% mafics and heavy minerals, fluvial sand.
5.0								
6.0	4	6-8	11-13-16-16		24			
7.0								
8.0	5	8-10	3-8-10-10		24			8.0 Medium - Coarse Sand, subangular - subrounded, moderately-well sorted, loose, wet, dark yellowish brown (10 YR/4/4), grains are dominantly quartz with about 7% mafics and heavy minerals, 2% pinkish K-feldspar (?), fluvial sand.
9.0								

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 11.0'
5.0' screen with .010" slots set at 11-6' depth.
6.0' riser, 2.0' stickup. Quartz sand pack from 11-5' depth.
Bentonite pellets from 6-3' depth. Backfilled 13-11'; 3.0-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	1:00 PM	6.68'	47.80	

WESTINGHOUSE BORING NUMBER: CAS-5

Westinghouse form "BL/P1 Rev. 1 8/1/89

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SK-MW-05

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
116 [illegible] STREET, [illegible], MA 01833
[illegible]

Page	2 of 2
Boring/Well No:	CAS-5
Westinghouse Job #:	
Well Elevation:	47.80
Drill Foreman:	
Westinghouse Geologist:	DUFFIN
Start Date:	2-13-90
End Date:	2-13-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-5
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER — Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From – To	Standard Penetration Test: Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	6	10-12	4-5-6-7		24			
11.0								
12.0	7	12-13	12-12		24		11.9	Clay, wet, cohesive, finely laminated into varve sets (?): each varve set ranges from 1/2-1 cm thick; clay rich, grayish brown lamina (2.5 Y/5/2) alternate with siltier, darker gray (5 Y/4/1) lamina, lacustrine clay-silt.
13.0								T.D. = 13'

GRANULAR SOILS Blows/Ft	Density	COHESIVE SOILS Blows/Ft	Density
0 – 4	v. loose	< 2	v. soft
4 – 10	loose	2 – 4	soft
10 – 30	m. dense	4 – 8	m. stiff
30 – 50	dense	8 – 15	stiff
> 50	v. dense	15 – 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 11.0'
5.0' screen with .010" slots set at 11–6' depth.
8.0' riser, 2.0' stickup. Quartz sand pack from 11–5' depth.
Bentonite pellets from 5–3' depth. Backfilled 13–11'; 3.0–0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	1:00 PM	6.68'	47.80	

WESTINGHOUSE BORING NUMBER CAS-5

Westinghouse form "BL/P1 Rev. 1 8/1/89

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TOWNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page: 1 of 2
Boring/Well No.: CAS-6
Westinghouse Job #:
Well Elevation: 48.80
Drill Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-14-90
End Date: 2-14-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-6
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER
Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	2-2-2-4		0			No recovery, surficial material is fill (0-2').
1.0								
2.0	2	2-4	6-26-43-28		18			Silty, Very Fine Sand, subangular - subrounded, poorly sorted, loose, moist, light olive brown (2.5 Y/5/4), fill or soil developed in fluvial sand.
3.0								3.0 Medium Sand, subangular - subrounded, well sorted, loose, moist, yellowish red (5 YR/4/6); color appears to be due to hematite staining, grains are dominantly quartz with about 5% mafics and heavy minerals, fluvial sand.
4.0	3	4-6	11-14-17-13		20			4.0 Medium - Coarse Sand, subangular - subrounded, moderately sorted, loose, wet, brown (10 YR/4/3), grains are dominantly quartz with about 5% mafics and heavy minerals, fluvial sand.
5.0								
6.0	4	6-8	9-10-11-12		24			Fine - Medium Sand; similar to above.
7.0								
8.0	5	8-10	5-6-7-8		24			Fine Sand; similar to above.
9.0								

GRANULAR SOILS

Blows/Ft	Density
0 - 4	v. loose
4 - 10	loose
10 - 30	m. dense
30 - 50	dense
> 50	v. dense

COHESIVE SOILS

Blows/Ft	Density
< 2	v. soft
2 - 4	soft
4 - 8	m. stiff
8 - 15	stiff
15 - 30	v. stiff
> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 12.0'
5.0' screen with .010" slots set at 12-7' depth.
0.0' riser, 2.0' stickup. Quartz sand pack from 12-6' depth.
Bentonite pellets from 5-3' depth. Backfilled 3-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	1:00 PM	6.68'	48.80	

WESTINGHOUSE BORING NUMBER: CAS-6

Westinghouse form "BL/P1 Rev. 1 8/1/89

SK-MW-06

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNEY STREET, GEORGETOWN, MA 01833
(508) 352-6402

Page: 2 of 2
Boring/Well No.: CAS-6
Westinghouse Job #:
Well Elevation: 48.80
Drill Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-14-90
End Date: 2-14-90

Project Name: CAS
Client Name: UTC
Boring Location: CAS-6
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in.)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
11.0								Fine - Medium Sand; similar to above.
12.0								
13.0								13.0
14.0								Clay, wet, cohesive, finely laminated into varve sets (1); each set is about 1/2 cm thick and consists of a darker (5 Y/4/1), silter layer about 3 mm thick and a clay rich lamina (2.5 Y/5/2) about 2 mm thick, lacustrine clay-silt.
15.0								T.D. = 15'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 12.0'
5.0' screen with .010" slots set at 12-7' depth.
9.0' riser. 2.0' sticksup. Quartz sand pack from 12-6' depth.
Bentonite pellets from 5-3' depth. Backfilled 3-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	1:00 PM	6.65'	48.80	

WESTINGHOUSE BORING NUMBER: CAS-6

Westinghouse form "BL/P1 Rev. 1 8/1/88

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page 1 of 2
Boring/Well No.: CAS-9
Westinghouse Job #:
Wat Elevation: 52.19
Drl. Foreman:
Westinghouse Geologist: DUFFIN
Start Date: 2-15-90
End Date: 2-15-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-9
Drilling Contractor: C. WELTY ASSOC.
Drilling Method: HOLLOW STEM AUGER
Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	3-8-15-18		24			Clayey Sand, roots, soil developed in a fluvial sand.
1.0								
2.0	2	2-4	17-19-25-23		24			2.0 — Fine - Medium Sand (clay and silt compose about 15% of sample), subangular - subrounded, moderately sorted, loose, moist, dark yellowish brown (10 YR/4/6), grains are dominantly quartz, fluvial sand.
3.0								
4.0	3	4-6	8-18-20-20					
5.0								
6.0	4	6-8	18-25-28-25					
7.0								
8.0	5	8-10	8-10-12-14		20			Slightly coarser grained than sample above. 8.5 — Very Fine Sand, subangular - subrounded, moderately sorted, loose, wet, very dark grayish brown (10 YR/3/2), grains of quartz compose about 80%, mafics and heavy minerals about 20%, fluvial sand (?).
9.0								

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 12.0'
5.0' screen with .010" slots set at 13-8' depth.
9.0' riser. 2.0' stickup. Quartz sand pack from 13-6' depth.
Bentonite pellets from 6-4' depth. Backfilled 14-13'; 4.0-0'.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	5:00 PM	8.52'	52.19	

WESTINGHOUSE BORING NUMBER: CAS-9

Westinghouse form "BL/P1 Rev. 1 8/1/89

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SK-MW-07

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TENNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page	2 of 2
Boring/Well No.	CAS-9
Westinghouse Job #	
Well Elevation	52.19
Drl Forman:	
Westinghouse Geologist	DUFFIN
Start Date	2-15-90
End Date	2-15-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-9
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	6	10-12	5-8-12-12		24			Fine - Medium Sand, subangular - subrounded, moderately sorted, loose, wet, brown (7.5 YR/4/2), grains are dominantly quartz with about 10% mafics and heavy minerals, fluvial sand.
11.0								
12.0	7	12-14	3-3-7-5					
								12.5
13.0								Coarse - Very Coarse Sand (~5% granules), subangular - subrounded, moderately-well sorted, loose, wet, (10 YR/4/2), grains are dominantly quartz with about 10% mafics and heavy minerals and 5% rock fragments, fluvial sand.
								13.2
14.0								Clay, wet, cohesive, finely laminated into varves (?): a varve set is about 8 mm thick and consists of a silter-rich, dark gray laminae (5 Y/4/1) 4 mm thick lamina overlain by a clay-rich, 4 mm thick, grayish brown (2.5 Y/5/2) lamina, lacustrine clay-silt.
								T.D. = 14'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
2" Well Point at 12.0'
5.0' screen with .010" slots set at 13-8' depth.
8.0' riser. 2.0' stickup. Quartz sand pack from 13-8' depth.
Bentonite pellets from 8-4' depth. Backfilled 14-13'; 4.0-0'.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	5:00 PM	8.52'	52.19	

WESTINGHOUSE BORING NUMBER: CAS-9

Westinghouse form "BL/P1 Rev. 1 8/1/89

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TURNEY STREET, CAMBRIDGE, MA 01833
(508) 332-6452

Page: 1 of 2
Boring/Well No.: CAS-10A
Westinghouse Job #:
Well Elevation: 43.43
Drill Forman:
Westinghouse Geologist: DUFFIN
Start Date: 2-16-90
End Date: 2-16-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-10A
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	1	0-2	2-7-13-15		22			
1.0								Clayey Sand, fill.
2.0	2	2-4	18-20-21-20		18			2.0 Fine - Medium Sand, subangular - subrounded, well-sorted, loose, moist, dark grayish brown (10 YR/4/2), grains are dominantly quartz with about 10% mafics and heavy minerals, fluvial sand.
3.0								
4.0	3	4-6	7-10-14-12		20			Medium Sand; similar to above.
5.0								
6.0	4	6-8	12-16-17-16		20			Same as above except sample is wet.
7.0								
8.0	5	8-10	4-9-10-11		24			Slightly coarser; intense hematite staining that shows a reddish yellow (7.5 YR/6/8) stain on yellowish brown (10 YR/5/8) sand.
9.0								

GRANULAR SOILS Blows/Ft	Density	COHESIVE SOILS Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
2" Well Point at 12.5'
5.0' screen with .010" slots set at 12.5-7.5' depth.
7.5' riser, 2.0' stickup. Quartz sand pack from 12.5-6.5' depth.
Bentonite pellets from 3.5-3.5' depth. Backfilled 14-12.5'; 3.5-0'.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	2:30 PM	5.98'	43.43	

WESTINGHOUSE BORING NUMBER: CAS-10A

Westinghouse form "BL/P1 Rev. 1 8/1/89

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WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TENNEY STREET, GEORGETOWN, MA 01833
(508) 352-6431

Boring/Well No.: CAS-10A
Westinghouse Job #:
Well Elevation: 43.43
Drill Foreman:
Westinghouse Geologist: DUFFY
Start Date: 2-16-90
End Date: 2-16-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-10A
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From / To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
	6	10-12	3-8-13-20		24			Same as above but lacks intense hematite staining.
11.0								
12.0	7	12-14	4-4-5-5					12.0 Coarse Sand, subangular - subrounded, moderately sorted, loose, wet, yellowish red (5 YR/4/6) hematite staining, grains are dominantly quartz with about 5% mafics and heavy minerals and 5% rock fragments, fluvial sand. 13.0
13.0								Clay, wet, cohesive, finely laminated (varves not very distinct), olive gray (5 Y/4/2), lacustrine clay-silt.
14.0								T.D. = 14'

GRANULAR SOILS		COHESIVE SOILS	
Blows/Ft	Density	Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:
2" Well Point at 12.5'.
5.0' screen with .010" slots set at 12.5-7.5' depth.
7.5' riser. 2.0' stickup. Quartz sand pack from 12.5-6.5' depth.
Bentonite pellets from 5.5-3.5' depth. Backfilled 14-12.5'; 3.5-0'.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90	2:30 PM	3.68'	43.43	

WESTINGHOUSE BORING NUMBER: CAS-10A

Westinghouse form "BL/P1 Rev. 1 8/1/89

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SK-MW-08D

WESTINGHOUSE ENVIRONMENTAL & GEOTECHNICAL SERVICES, INC.
118 TENNEY STREET, GEORGETOWN, MA 01833
(508) 352-6492

Page	1 of 1
Boring/Well No.:	CAS-108
Westinghouse Job #:	
Well Elevation:	45.21
Drill Forman:	
Westinghouse Geologist:	DUFFIN
Start Date:	2-23-90
End Date:	2-28-90

Project Name: CAS
Client Name: U.T.C.
Boring Location: CAS-108
Drilling Contractor: C. WELTI ASSOC.
Drilling Method: HOLLOW STEM AUGER Auger Size: 3.75" ID

Sampler: Unless noted, sampler consists of a 2" split-spoon driven using a 140 lb. hammer falling 30 in.

DEPTH (FT)	SAMPLE Type & No.	SAMPLE Range From | To	Standard Penetration Test Blows per 6" on split-spoon	Pen (in)	Rec (in)	Headspace HNU Reading	Strata Change Depth	Field Classification and Drilling Information
10.0								
20.0	1	18-20	1-0-1-1		24			Clay, wet, cohesive, finely laminated, dark gray (5 Y/4/2) lacustrine clay-silt.
30.0								
40.0	1	50-52	1-1-1-2		24			Similar to above sample.
50.0								
60.0								T.D. = 61'

On 2/23/90 drilled to 20' with 13" O.D. (8" I.D.) H.S.A. Installed 8" diameter steel pipe at 18' and pressure grouted in place.

On 2/28/90 drilled through grout to 60'. Installed well at 59'.

GRANULAR SOILS Blows/Ft	Density	COHESIVE SOILS Blows/Ft	Density
0 - 4	v. loose	< 2	v. soft
4 - 10	loose	2 - 4	soft
10 - 30	m. dense	4 - 8	m. stiff
30 - 50	dense	8 - 15	stiff
> 50	v. dense	15 - 30	v. stiff
		> 30	hard

QA/QC CHECKED BY:

NOTES:

2" Well Point at 58.0'
10.0' screen with .010" slots set at 58-48' depth
48' riser, 2.0' stickup. Quartz sand pack from 58-38' depth.
Bentonite-Cement Grout from 38-0' depth.

GROUNDWATER READINGS

DATE	TIME	WATER AT	CASING AT	STABILIZATION
3-7-90		8.78'	45.21	

WESTINGHOUSE BORING NUMBER: CAS-108

Westinghouse form "BL/P1 Rev. 1 8/1/89

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SK-MW-09

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SK-MW-09

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 2
LOCATION N 146,767
E 186,692

ELEVATION 62.5
DATUM MDC/NGVD
START 3 October 1991
FINISH 4 October 1991
DRILLER B. Ursin
H & A REP C. Osgood

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE CME75
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0						
		2	S1	1.0		Loose brown fine SAND, trace roots
		2	24	3.0		
		2				
		5				-STREAM TERRACE DEPOSITS-
					57.5	
5		2	S2	5.0	5.0	Loose red brown fine SAND, little silt, indistinct stratification
		3	24	7.0		
		4				-STREAM TERRACE DEPOSITS-
		5			55.5	
					7.0	
10		2	S3	10.0		Loose brown fine SAND, little medium sand, indistinct stratification
		3	12	12.0		
		3				
		2	S4	12.0		Loose brown medium to fine SAND, indistinct stratification
		4	11	14.0		
		3				-STREAM TERRACE DEPOSITS-
		7			48.5	
		2	S5	14.0	14.0	Very loose brown medium to fine SAND, little coarse sand, trace fine gravel
15		1	20	16.0		
		2				-STREAM TERRACE DEPOSITS-
		3			46.5	
		2	S6	16.0	16.0	Very loose brown medium SAND, trace fine sand
		1	10	18.0		
		1				Loose brown medium SAND, trace fine sand
		1				
		2	S7	18.0		
		2	6	20.0		
		6				
		5				
20		1	S8	20.0		Loose brown medium SAND, trace fine sand and coarse sand
		2	10	22.0		
		3				
		4				-STREAM TERRACE DEPOSITS-
						Note: Augers sank, splitspoon stuck in augers due to running sand condition.
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/3/91	1300		10.0	10.0	7.5
10/4/91	0745		22.0	17.7	7.1

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	29.0
ROCK CORED (LIN FT)	--
SAMPLES	10s

BORING NO. SK-MW-09

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SK-MW-09
FILE NO. 90358-40
SHEET NO. 2 of 2

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
25		5	S9	25.0		
		5	2	27.0	36.5	
		22			26.0	Dense red brown silty medium to fine SAND, trace coarse sand, and fine gravel
		17				
		27	S10	27.0		Medium dense red brown silty fine SAND, little fine gravel, trace coarse to medium sand
		8	6	29.0		
		9				-GLACIAL TILL-
		15			33.5	
					29.0	Auger Refusal on Probable Bedrock at 29.0 ft.
30						
35						
40						
45						
50						
55						
60						

SK-MW-10

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SK-B-10

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 2
LOCATION N 145,509
E 186,236

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE MOBIL B53
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER

ELEVATION 53.9
DATUM MDC/NGVD
START 8 October 1991
FINISH 9 October 1991
DRILLER K. Christiana
H & A REP C. Osgood

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0					53.4	
					0.5	Visible in borehole: brown silty fine SAND, little loam, roots
						-FOREST MAT-
		3	S1	1.0		
		4	20	3.0		Loose red brown fine SAND, trace silt
		4				
		5				
5						
		6	S2	5.0		Medium dense red-brown fine SAND, little medium sand, trace silt in single 1/2 in. seam
		7	20	7.0		
		6				
		7				
						-STREAM TERRACE DEPOSITS-
10						
		7	S3	10.0		Medium dense red-brown medium to fine SAND, trace coarse sand, silt in single 1/2 in. seam
		8	18	12.0		
		7				
		10				
15						
		4	S4	15.0		Loose, gray-brown medium to fine SAND
		4	15	17.0		
		5				
		4				
20						
		8	S5	20.0		Medium dense brown medium to fine SAND, trace coarse sand
		7	12	22.0		
		8				
		9				
						-STREAM TERRACE DEPOSITS-
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/8/91	1430	25.0	21.3	11.1	
10/9/91	0900	28.0	29.0	8.6	
10/9/91	1100	15.0	15.0	8.1	

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	29.0
ROCK CORED (LIN FT)	--
SAMPLES	7s

BORING NO. SK-B-10

SK-MW-10

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SK-B-10
FILE NO. 90358-40
SHEET NO. 2 of 2

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
25		12	S6	25.0		Medium dense red-brown medium to fine SAND
		12	4	27.0		
		8				
		6				
		11	S7	27.0		
		12	10	28.5	25.9	
		50			28.0	
					24.9	No Recovery - possible Glacial Till or Decomposed Bedrock
					29.0	Refusal at 29.0 ft.
30						
35						
40						
45						
50						
55						
60						

BORING NO. SK-B-10

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SK-MW-11

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 1
LOCATION N 146,081
E 185,100

ELEVATION 48.1 SK-MW-11
DATUM MDC/NGVD
START 7 October 1991
FINISH 7 October 1991
DRILLER K. Christiana
H & A REP S. Gleason

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE MOBIL B53
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER SK-MW-11

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0						
		4	S1	1.0	46.6	Silty fine SAND
		4	20	3.0		-FILL-
		6			1.5	Organic SILT
		4				-ALLUVIUM-
					45.1	
					3.0	
5		11	S2	5.0		
		10	21	7.0		
		9				Medium to fine SAND
		11				
10		6	S3	10.0		
		7	24	12.0		-STREAM TERRACE DEPOSITS-
		7				
		6				
		5	S4	12.0		
		8	24	14.0		
		7				
		7				
					33.1	
15		3	S5	15.0	15.0	
		3	24	17.0		Varved CLAY
		5				
		4				-GLACIOLACUSTRINE-
		4	S6	17.0		
		4	12	19.0		
		3				
		3				
					29.1	
					19.0	Bottom of Exploration at 19.0 ft.
20						
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/7/91			15.0	19.0	6.2

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	19.0
ROCK CORED (LIN FT)	--
SAMPLES	6s

BORING NO. SK-MW-11

SK - MW - 12

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SK-MW-12

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 1
LOCATION N 146,773
E 184,585

ELEVATION 46.3 SK-MW-12
DATUM MDC/NGVD
START 2 October 1991
FINISH 2 October 1991
DRILLER B. Ursin
H & A REP C. Osgood

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE CME75
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER SK-MW-12

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0					46.1	
					0.2	-ASPHALT-
						-FILL-
		5	S1	1.0	45.3	
		4	19	3.0	1.0	
		3				
		3				
						Medium to fine SAND
5						
		4	S2	5.0		
		4	24	7.0		
		4				
		6				
						-STREAM TERRACE DEPOSITS-
10						
		3	S3	10.0		
		3	24	12.0		
		3				
					31.8	
					14.5	
15						Laminated silty CLAY
		1	S4	15.0		
		1	18	17.0		
		2				
		1				
		1	S5	17.0		
		2	6	19.0		
		1				-GLACIOLACUSTRINE-
		1				
		1	S6	19.0		
20		WOH	4	21.0		
		1				
		WOH			25.3	
					21.0	Bottom of Exploration at 21.0 ft.
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
10/2/91	1500		14.5	14.5	6.3
10/2/91	1630		14.5	14.5	6.1
10/3/91	0800		14.5	14.5	6.1

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	21.0
ROCK CORED (LIN FT)	--
SAMPLES	6s

BORING NO. SK-MW-12

HALEY & ALDRICH, INC.
GLASTONBURY
CONNECTICUT

TEST BORING REPORT

BORING NO. SK-MW-13

PROJECT SITE-WIDE ENVIRONMENTAL MONITORING PROGRAM EAST HARTFORD, CONNECTICUT
CLIENT PRATT & WHITNEY AIRCRAFT
CONTRACTOR CLARENCE WELTI ASSOCIATES, INC.

FILE NO. 90358-40
SHEET NO. 1 of 1
LOCATION N 144,541
E 184,869

ITEM	CASING	DRIVE SAMPLER	CORE BARREL	DRILLING EQUIPMENT & PROCEDURES
TYPE	HSA	SS	--	RIG TYPE MOBIL B53
INSIDE DIAMETER (IN)	3-3/4	1-3/8	--	BIT TYPE --
HAMMER WEIGHT (LB)	--	140	-	DRILL MUD --
HAMMER FALL (IN)	--	30	-	OTHER SK-MW-13

ELEVATION 41.4 SK-MW-13
DATUM MDC/NGVD
START 7 October 1991
FINISH 7 October 1991
DRILLER K. Christiana
H & A REP S. Gleason

DEPTH (FT)	CASING BLOWS PER FT	SAMPLER BLOWS PER 6 IN	SAMPLE NO.& REC. (IN)	SAMPLE DEPTH (FT)	ELEV./ DEPTH (FT)	VISUAL DESCRIPTION AND REMARKS
0						
		7	S1	1.0		Loose brown medium to fine SAND
		4	15	3.0		
		4				
		6				
5		3	S2	5.0		No recovery - 2 tries
		4	12	7.0		(3rd try) same as S1, varies to fine SAND
		4				
		5				-STREAM TERRACE DEPOSITS-
10		WOH	S3	10.0		Very loose brown fine SAND, varies to coarse
		WOH	12	12.0		to fine SAND
		4				
		4				
		2		13.0		No recovery-2 tries
		2		15.0		
		3				
		3			26.4	
15		1	S4	15.0	15.0	Very soft gray laminated silty CLAY.
		1	3	17.0		
		1				-GLACIOLACUSTRINE-
		1				
		P	S5	17.0		Same as S4, with partings of red fine SAND
		U	24	19.0		
		S				
		H			22.4	
					19.0	Bottom of Exploration at 19.0 ft.
20						Note: Observation well installed at 12.0 ft.
25						

WATER LEVEL DATA

DATE	TIME	ELAPSED TIME (HR)	DEPTH (FT) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
					6.2

SAMPLE IDENTIFICATION

O OPEN END ROD
T THIN WALL TUBE
U UNDISTURBED SAMPLE
S SPLIT SPOON

SUMMARY

OVERBURDEN (LIN FT)	19.0
ROCK CORED (LIN FT)	--
SAMPLES	5S

BORING NO. SK-MW-13

GEOLOGIC BORING LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date** 8/27/96 **End Date** 8/27/96	**Boring ID** **SK-MW-19**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** F. Postma
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 8 **At:** 0 **Hours** ▽ **Northing:**
Depth: **At:** **Hours** ▼ **Easting:**

Elevation/ Depth	Sample Information: Sample No.	Recovery (%)	Blows /6"	Sample Description: Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesive	PID/FID (ppm)
0					
	1017691	25	10,11,10,9	Pink, fine SAND, some medium Sand, little coarse Gravel, dry, loose to moderately dense	0.0
	1017692	0	14,15,21,23	No recovery	
4	1017693	20	17,19,29,27	Pink, medium SAND, some fine Sand, loose, moist, stratified	0.0
	1017694	100	27,24,37,35	As above, fine SAND lense	0.0
8 ▽	1017695	70	32,5,5,7	Grey to dark brown, fine SAND, loose, wet, stratified, gleyed	0.0
	1017696	50	4,5,2,5	Pink to olive brown, medium SAND, some fine Sand, trace coarse Sand, loose, wet	0.0
12	1017697	80	7,10,8,10	Yellowish brown to yellowish red, medium SAND, little fine Sand, loose, wet	0.0
	1017698		3,2,2,3	Grey, SILT, little Clay, wet, loose; red fine SAND lenses at 14.2', 14.9', 15.6'	0.0
16				Bottom of boring 16'	
20					

Comments:

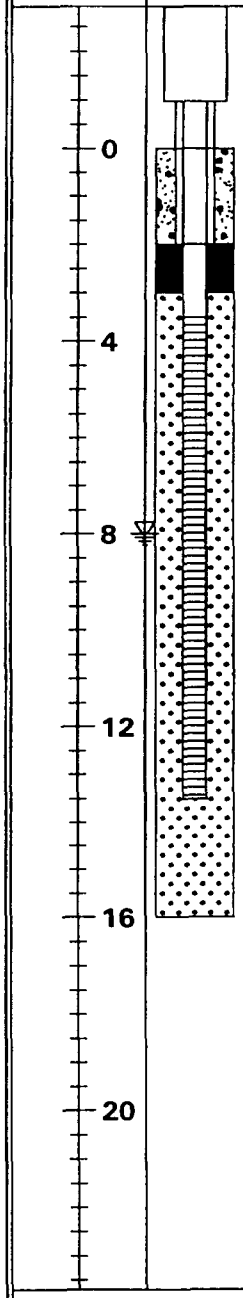
Boring No: SK-MW-19

LOUREIRO ENGINEERING ASSOCIATES, PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone(203)747-6181 FAX (203)747-8822

MONITORING WELL COMPLETION LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date:** 8/27/96 **End Date** 8/27/96	**Boring ID** **SK-MW-19**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** F. Postma
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 8 **At:** 0 **Hours** ▽ **Northing:**
Depth: **At:** **Hours** ▼ **Easting:**



Elev./ Depth (Ft).	Well Construction Diagram	Sample Description Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness
0		Pink, fine SAND, some medium Sand, little coarse Gravel, dry, loose to moderately dense
4		No recovery
		Pink, medium SAND, some fine Sand, loose, moist, stratified
8 ▽		As above, fine SAND lense
		Grey to dark brown, fine SAND, loose, wet, stratified, gleyed
12		Pink to olive brown, medium SAND, some fine Sand, trace coarse Sand, loose, wet
		Yellowish brown to yellowish red, medium SAND, little fine Sand, loose, wet
16		Grey, SILT, little Clay, wet, loose; red fine SAND lenses at 14.2', 14.9', 15.6'
		Bottom of boring 16'
20		

COVER
TYPE: Stick up

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: 2"
Length: 6.5'
Stick Up: 2.9'

SEAL
Type: Bentonite Chips
Quantity: .5 bags
Top Depth: 2'
Bottom Depth: 3'

SCREEN
Type: Schedule 40 PVC
Diameter: 2"
Slot Size: 0.010"
Top Depth: 3.5'
Bottom Depth: 13.5'

FILTER PACK
Type: #0 Sand
Top Depth: 3'
Bottom Depth: 16'

Comments:

Boring No: SK-MW-19

LEA
LOUREIRO ENGINEERING ASSOCIATES,PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

GEOLOGIC BORING LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date** 8/27/96 **End Date** 8/27/96	**Boring ID** **SK-MW-20**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** F. Postma
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 7.7 **At:** 0 **Hours** **Northing:**
Depth: **At:** **Hours** **Easting:**

Elevation/ Depth	Sample Information: Sample No.	Recovery (%)	Blows /6"	Sample Description: Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesive	PID/FID (ppm)
0	1017682	50	3,6,6,4	Top 6": Dark brown to strong brown, fine SAND, trace(-) Silt, loose, moist, fibric Organic Material; Bottom 6": Yellowish red, fine SAND, trace Silt, loose, moist	0.0
	1017683	60	5,7,7,10	Pink, fine SAND, trace(+) Silt, loose, moist, stratified (poorly)	0.0
4	1017684	60	4,7,10,15	As above, SILT lense at 5.2 (0.1' thick)	0.0
	1017685	100	7,10,13,10	Top 1.6': As above; Bottom 0.4': Yellowish red, medium SAND, some fine Sand, loose, moist to wet, mottles	0.0
8	1017686 1017689	85	10,8,7,5	Top 6": Pink, fine SAND, little Silt, loose to moderately dense, moist to wet; Bottom 1': Reddish yellow, medium SAND, little fine Sand, loose, wet, stratified	0.0
	1017687	70	3,3,4,4	As above	0.0
12	1017688	75	7,9,9,6	Top 1': As above; Bottom 6": Pale yellowish brown to dark brown, medium SAND, some fine Sand, little coarse Sand, loose, wet, manganese staining	0.0
	1017690	100	4,4,5,3	Top 1': As above; Bottom 1': Grey, SILT, same Clay, loose, wet, stratified, red fine SAND lenses at 15.4', 15.6'	0.0
16				Bottom of boring at 16'	
20					

Comments:

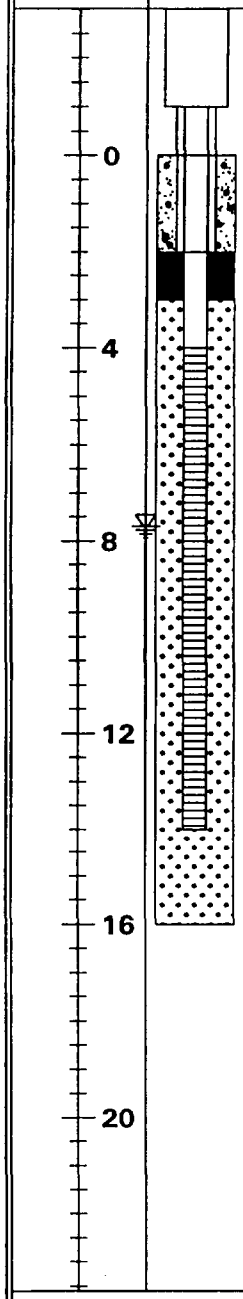
Boring No: SK-MW-20

LEA
LOUREIRO ENGINEERING ASSOCIATES, PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone(203)747-6181 FAX (203)747-8822

MONITORING WELL COMPLETION LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date:** 8/27/96 **End Date** 8/27/96	**Boring ID** **SK-MW-20**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** F. Postma
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 7.7 **At:** 0 **Hours** **Northing:**
Depth: **At:** **Hours** **Easting:**



Elev./ Depth (Ft).	Sample Description (Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness)
0	Top 6": Dark brown to strong brown, fine SAND, trace(-) Silt, loose, moist, fibric Organic Material; Bottom 6": Yellowish red, fine SAND, trace Silt, loose, moist
	Pink, fine SAND, trace(+) Silt, loose, moist, stratified (poorly)
4	As above, SILT lense at 5.2 (0.1' thick)
	Top 1.6': As above; Bottom 0.4': Yellowish red, medium SAND, some fine Sand, loose, moist to wet, mottles
8	Top 6": Pink, fine SAND, little Silt, loose to moderately dense, moist to wet; Bottom 1': Reddish yellow, medium SAND, little fine Sand, loose, wet, stratified
	As above
12	Top 1': As above; Bottom 6": Pale yellowish brown to dark brown, medium SAND, some fine Sand, little coarse Sand, loose, wet, manganese staining
	Top 1': As above; Bottom 1': Grey, SILT, same Clay, loose, wet, stratified, red fine SAND lenses at 15.4', 15.6'
16	Bottom of boring at 16'
20	

COVER
TYPE: Stick up

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: 2"
Length: 7'
Stick Up: 3.0'

SEAL
Type: Bentonite Chips
Quantity: .5 bags
Top Depth: 2'
Bottom Depth: 3'

SCREEN
Type: Schedule 40 PVC
Diameter: 2"
Slot Size: 0.010"
Top Depth: 4'
Bottom Depth: 14'

FILTER PACK
Type: #0 Sand
Top Depth: 3'
Bottom Depth: 14.5'

Comments:

Boring No: SK-MW-20

LEA
LOUREIRO ENGINEERING ASSOCIATES,PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

GEOLOGIC BORING LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date** 8/27/96 **End Date** 8/27/96	**Boring ID** **SK-MW-21**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** F. Postma
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 7.5 **At:** 0 **Hours** ▽ **Northing:**
Depth: **At:** **Hours** ▼ **Easting:**

Elevation/ Depth	Sample Information: Sample No.	Recovery (%)	Blows /6"	Sample Description: Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesive	PID/FID (ppm)
0	1017675	50	1,1,2,3	Top 6": Strong brown, fine SAND, trace Silt, loose to very loose, moist, fibric Organic Matter; Bottom 6": Pinkish yellow, fine SAND, trace(+) medium Sand, loose, moist, stratified	0.0
	1017676	80	5,7,9,10	As above	0.0
4	1017677	80	4,6,7,9	Yellowish red to pink, medium SAND, some fine Sand, loose, moist, stratified, mottles	0.0
	1017678	70	9,9,8,10	As above, possible manganese staining at 7.1', wet at 7.5'	0.0
8	1017679	90	5,5,7,6	Pinkish grey to yellowish red, medium SAND, little fine Sand, loose, wet	0.0
	1017680	95	4,4,3,5	Top 1.5': As above; Bottom 0.5': Yellowish red, medium SAND, some coarse Sand, loose, wet, mottles, stratified	0.0
12	1017681	80		Top 1.3': As above; Bottom 0.5': Grey, SILT, little Clay, moist to wet, stratified	0.0
				Bottom of boring 14'	
16					
20					

Comments:

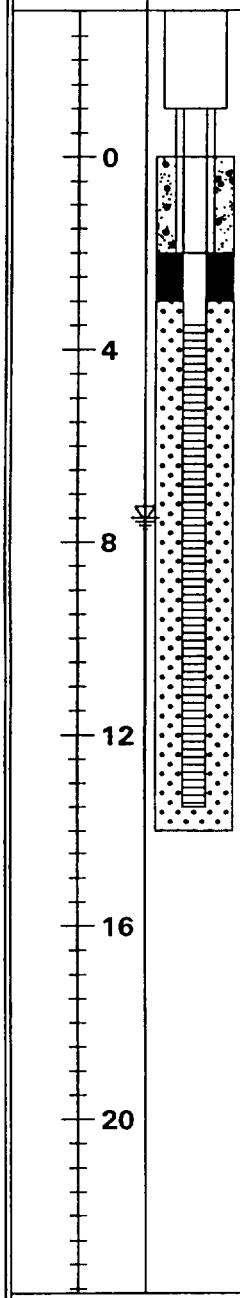
Boring No: SK-MW-21

LEA
LOUREIRO ENGINEERING ASSOCIATES, PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone(203)747-6181 FAX (203)747-8822

MONITORING WELL COMPLETION LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date:** 8/27/96 **End Date** 8/27/96	**Boring ID** **SK-MW-21**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** F. Postma
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 7.5 **At:** 0 **Hours** **Northing:**
Depth: **At:** **Hours** **Easting:**



Elev./ Depth (Ft).	Sample Description (Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness)
0	Top 6": Strong brown, fine SAND, trace Silt, loose to very loose, moist, fibric Organic Matter; Bottom 6": Pinkish yellow, fine SAND, trace(+) medium Sand, loose, moist, stratified
4	As above
	Yellowish red to pink, medium SAND, some fine Sand, loose, moist, stratified, mottles
8	As above, possible manganese staining at 7.1', wet at 7.5'
	Pinkish grey to yellowish red, medium SAND, little fine Sand, loose, wet
12	Top 1.5': As above; Bottom 0.5': Yellowish red, medium SAND, some coarse Sand, loose, wet, mottles, stratified
	Top 1.3': As above; Bottom 0.5': Grey, SILT, little Clay, moist to wet, stratified
16	Bottom of boring 14'
20	

COVER
TYPE: Stick up

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: 2"
Length: 6.5'
Stick Up: 3.0'

SEAL
Type: Bentonite Chips
Quantity: .5 bags
Top Depth: 2'
Bottom Depth: 3'

SCREEN
Type: Schedule 40 PVC
Diameter: 2"
Slot Size: 0.010"
Top Depth: 3.5'
Bottom Depth: 13.5'

FILTER PACK
Type: #0 Sand
Top Depth: 3'
Bottom Depth: 13.5'

Comments:

Boring No: SK-MW-21

LEA
LOUREIRO ENGINEERING ASSOCIATES,PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

GEOLOGIC BORING LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date** 8/27/96 **End Date** 8/27/96	**Boring ID** **SK-MW-22**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** F. Postma
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 7 **At:** 0 **Hours** ▽ **Northing:**
Depth: **At:** **Hours** ▼ **Easting:**

Elevation/ Depth	Sample Information: Sample No.	Recovery (%)	Blows /6"	Sample Description: Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesive	PID/FID (ppm)
0	1017667	50	3,4,6,8	Top 6": Strong brown, fine SAND and SILT, loose, moist, fibric Organic Matter, roots; Bottom 6": Brownish pink, fine SAND, trace(-) medium Sand, loose, moist, stratified	0.0
	1017668	70	9,11,17,17	As above, SILT lense at 3.2' (0.1' thick)	0.0
4	1017669	80	7,12,14,16	Light pinkish brown, fine SAND, little medium Sand, moist, moderately dense, mottles at tip, stratified	0.0
▽	1017670	70	10,13,14,14	Top 6": Reddish yellow, medium SAND, with fine Sand, moderately dense, moist, mottles; Bottom 12": Greyish brown, medium SAND, with fine Sand, moderately dense, wet, oil staining	0.0
8	1017671	85	3,4,7,6	As above, oil staining at 9.2'	0.0
	1017672		5,5,6,7	As above	0.0
12	1017673		5,8,12,12	As above, iron staining at 13.1'	0.0
	1017674	100	3,3,3,5	Grey, SILT, little Clay, wet, stratified, fat CLAY lense at 14.7'	0.0
16				Bottom of boring at 16'	
20					

Comments:

Boring No: SK-MW-22

LEA
LOUREIRO ENGINEERING ASSOCIATES, PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone(203)747-6181 FAX (203)747-8822

MONITORING WELL COMPLETION LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date:** 8/27/96 **End Date** 8/27/96	**Boring ID** **SK-MW-22**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** F. Postma
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 7 **At:** 0 **Hours** ▽ **Northing:**
Depth: **At:** **Hours** ▽ **Easting:**

Elev./ Depth (Ft).	Well Construction Diagram	Sample Description Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness
0		Top 6": Strong brown, fine SAND and SILT, loose, moist, fibric organic matter, roots; Bottom 6": Brownish pink, fine SAND, trace(-) medium Sand, loose, moist, stratified
		As above, SILT lense at 3.2' (0.1' thick)
4		Light pinkish brown, fine SAND, little medium Sand, moist, moderately dense, mottles at tip, stratified
		Top 6": Reddish yellow, medium SAND, with fine Sand, moderately dense, moist, mottles; Bottom 1': Greyish brown, medium SAND, with fine Sand, moderately dense, wet, oil staining
8		As above, oil staining at 9.2'
		As above
12		As above, iron staining at 13.1'
		Grey, SILT, little Clay, wet, stratified, fat CLAY lense at 14.7'
16		Bottom of boring at 16'
20		

COVER
TYPE: Stick up

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: 2"
Length: 6'
Stick Up: 3.2'

SEAL
Type: Bentonite Chips
Quantity: .5 bags
Top Depth: 2'
Bottom Depth: 2.5'

SCREEN
Type: Schedule 40 PVC
Diameter: 2"
Slot Size: 0.010"
Top Depth: 3'
Bottom Depth: 13'

FILTER PACK
Type: #0 Sand
Top Depth: 2.5'
Bottom Depth: 14'

Comments:

Boring No: SK-MW-22

LEA
LOUREIRO ENGINEERING ASSOCIATES,PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

GEOLOGIC BORING LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date** 8/26/96 **End Date** 8/26/96	**Boring ID** **SK-MW-23**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** J. Klapheke
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 4.5 **At:** 0 **Hours** ▽ **Northing:**
Depth: **At:** **Hours** ▼ **Easting:**

Elevation/ Depth	Sample Information: Sample No.	Recovery (%)	Blows /6"	Sample Description: Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesive	PID/FID (ppm)
0	1017651	92	5,15,15,16	10": Topsoil; 12": Reddish brown, fine SAND, dry to slightly moist, loose to slightly dense	1.6
	1017652	83	17,20,29,27	Reddish brown, fine SAND, with Silt, moist to wet, slightly dense	10.4
4 ▽	1017653	100	7,10,13,15	As above, wet, slightly dense	9.5
	1017654	100	8,11,11,12	Reddish brown, fine to coarse SAND, with Silt, wet, loose	5.4
8	1017655	100	2,3,6,5	As above	3.1
	1017656	42	3,2,2,7	Reddish brown, fine to coarse(+) SAND and SILT, wet, loose, trace(-) fine Gravel	2.4
12	1017657	100	5,7,6,7	As above	0.8
	1017658	100		12": Olive grey, CLAY, trace Silt, trace fine Sand, dense, wet	
16				Bottom of boring at 16'	
20					

Comments:

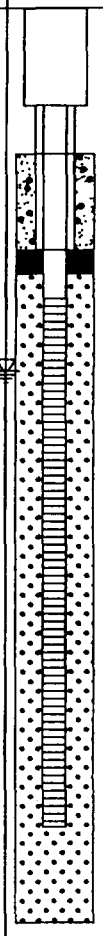
LOUREIRO ENGINEERING ASSOCIATES, PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone(203)747-6181 FAX (203)747-8822

Boring No: SK-MW-23

MONITORING WELL COMPLETION LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date:** 8/26/96 **End Date** 8/26/96	**Boring ID** **SK-MW-23**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** J. Klapheke
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: 4.5 **At:** 0 **Hours** **Northing:**
Depth: **At:** **Hours** **Easting:**

Elev./ Depth (Ft).	Well Construction Diagram	Sample Description Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness
0		10": Topsoil; 12": Reddish brown, fine SAND, dry to slightly moist, loose to slightly dense
		Reddish brown, fine SAND, with Silt, moist to wet, slightly dense
4		As above, wet, slightly dense
		Reddish brown, fine to coarse SAND, with Silt, wet, loose
8		As above
		Reddish brown, fine to coarse(+) SAND and SILT, wet, loose, trace(-) fine Gravel
12		As above
		12": Olive grey, CLAY, trace Silt, trace fine Sand, dense, wet
16		Bottom of boring at 16'
20		

COVER
TYPE: Stick Up

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: 2"
Length: 6'
Stick Up: 3.0'

SEAL
Type: Bentonite Chips
Quantity: .5 chips
Top Depth: 2'
Bottom Depth: 2.5'

SCREEN
Type: Schedule 40 PVC
Diameter: 2"
Slot Size: 0.010"
Top Depth: 3'
Bottom Depth: 13'

FILTER PACK
Type: #0 Sand
Top Depth: 2.5'
Bottom Depth: 14'

Comments:

Boring No: SK-MW-23

LEA
LOUREIRO ENGINEERING ASSOCIATES,PC
100 Northwest Drive, Plainville, Connecticut, 06062, Phone (203)747-6181 Fax (203)747-8822

GEOLOGIC BORING LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 **Client:** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date** 8/26/96 **End Date** 8/26/96	**Boring ID** **SK-MW-24**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** J. Klapheke
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: **At:** **Hours** **Northing:**
Depth: **At:** **Hours** **Easting:**

Elevation/ Depth	Sample Information: Sample No.	Recovery (%)	Blows /6"	Sample Description: Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesive	PID/FID (ppm)
0	1017659	33	4,6,6,8	6": Topsoil; 2": Dark brown, fine SAND and SILT, dry, loose	
	1017660	83	3,4,4,5	Light greyish brown, fine(+) to coarse SAND, with Silt, moist, loose	4.5
4	1017661	58	4,4,2,5	As above, moist to wet	14.3
	1017662	75	5,10,12,14	As above, wet	13.0
8	1017663	79	3,3,4,6	2": As above; 17": Light grey brown, fine(+) to coarse SAND, with Silt, trace(-) fine Gravel, wet, slightly dense	12.3
	1017664	100	5,7,7,9	As above	21.1
12	1017665	100	9,8,12,15	As above, dark reddish brown	10.2
	1017666	100	11,7,8,14	10": As above; 10": Dark reddish brown, fine to coarse(+) SAND, with fine Gravel, trace Silt, wet, loose; 2": Olive grey CLAY, trace Silt, trace fine Sand, wet, dense	43.2
16				Bottom of boring at 16'	
20					

Comments:

Boring No: SK-MW-24

LEA
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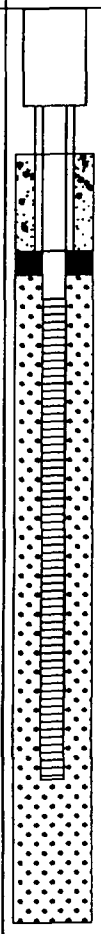
100 Northwest Drive, Plainville, Connecticut, 06062, Phone(203)747-6181 FAX (203)747-8822

MONITORING WELL COMPLETION LOG

Project: South Klondike Monitoring Well Install. **LEA Comm No:** 68TR672 ***Client:*** Pratt & Whitney **Location:** East Hartford, Connecticut	**Start Date:** 8/26/96 **End Date** 8/26/96	**Boring ID** **SK-MW-24**

Drilling Contractor: Environ. Drilling Inc. **Logged By:** J. Klapheke
Drilling Method: Hollow stem auger **Drilling Foreman:** Dwayne
Sampling Method: Split spoon **Drill Rig:** D120
Groundwater Observations: **Surface Elevation:**
Depth: **At:** **Hours** ▽ **Northing:**
Depth: **At:** **Hours** ▼ **Easting:**

Elev./ Depth (Ft).	Well Construction Diagram	Sample Description Color, Prim. Grain Size, Sec. Grain Sizes, Moist, Sort, Spher, Angul, Sed Struct, Density, Cohesiveness
0		6": Topsoil; 2": Dark brown, fine SAND and SILT, dry, loose
		Light greyish brown, fine(+) to coarse SAND, with Silt, moist, loose
4		As above, moist to wet
		As above, wet
8		2": As above; 17": Light grey brown, fine(+) to coarse SAND, with Silt, trace(-) fine Gravel, wet, slightly dense
		As above
12		As above, dark reddish brown
		10": As above; 10": Dark reddish brown, fine to coarse(+) SAND, with fine Gravel, trace Silt, wet, loose; 2": Olive grey CLAY, trace Silt, trace fine Sand, wet, dense
16		Bottom of boring at 16'
20		

COVER
TYPE: Stick-up

BACKFILL
Type: N/A
Top Depth:
Bottom Depth:

CASING
Diameter: 2"
Length: 6'
Stick Up: 3'

SEAL
Type: Bentonite Chips
Quantity: .5 bags
Top Depth: 2.0'
Bottom Depth: 2.5'

SCREEN
Type: Schedule 40 PVC
Diameter: 2"
Slot Size: 0.010"
Top Depth: 3'
Bottom Depth: 13'

FILTER PACK
Type: #0 Sand
Top Depth: 2.5'
Bottom Depth: 14'

Comments:

Boring No: SK-MW-24

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DRAFT

TECHNICAL MEMORANDUM 2
WATER-LEVEL MEASUREMENTS AND SITE-SURVEY DATA

SUMMARY
SITE INVESTIGATION AND REMEDIATION REPORT
AIRPORT/KLONDIKE AREA
AT
PRATT & WHITNEY
EAST HARTFORD, CONNECTICUT
EPA ID No. CTD990672081

Prepared for:

PRATT & WHITNEY
400 Main Street
East Hartford, Connecticut 06108

Prepared by:

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut 06062

LEA Comm. No. 68V8124

Table of Contents

Acronyms

DEP	State of Connecticut Department of Environmental Protection
DPH	State of Connecticut Department of Public Health
H&A	Haley & Aldrich, Inc.
LEA	Loureiro Engineering Associates, P.C.
M&E	Metcalf & Eddy, Inc.
QA/QC	Quality Assurance/Quality Control
PPE	Personal Protective Equipment
SOP	Standard Operating Procedure
TM	Technical Memoranda
TOC	Top Of Casing
TOR	Top Of Riser

1. INTRODUCTION

1.1 Purpose and Objective

This Technical Memoranda (TM) presents the methodology and results of water-level measurements from groundwater monitoring wells and piezometers in the Airport/Klondike Area of the Pratt & Whitney (P&W) facility located at 400 Main Street (Main Street facility) in the Town of East Hartford, Connecticut. Water-levels were measured and an instrument survey was performed as part of the investigation activities completed for the Airport/Klondike Area.

The water-level measurements were used to provide information on the direction of groundwater flow across the Site and to evaluate seasonal variations in the water-table or piezometric surface elevation and flow direction. The instrument survey was performed to obtain the horizontal locations and vertical reference elevations of the sampling locations utilized in the site-wide groundwater investigation. These data are presented on a site-wide basis because of the nature of groundwater movement and the distribution of monitoring wells across the site.

1.2 Background

The Airport/Klondike Area is located on the eastern portion of the P&W Main Street facility on the east side of the main plant, north of Brewer Street and south of Silver Lane. The Airport/Klondike Area consists of four study areas that include the North and South Airport Areas and the North and South Klondike Areas. Previous investigations at the Site performed from 1990 through 1993 resulted in the installation and sampling of groundwater monitoring wells and temporary wellpoints throughout the Airport/Klondike Area. For a more detailed account of the monitoring wells refer to *Technical Memorandum 1, Monitoring Installation and Development and Soil Sampling*.

In the North Airport Area, wells NA-MW-01 through NA-MW-04 were installed in October 1991 during the Site-wide Environmental Monitoring Program at the Main Street facility by Haley & Aldrich, Inc. (H&A). In the North Airport Area, piezometers NA-PZ-01 through NA-PZ-12 were installed in November 1991 during the Site-wide Environmental Monitoring Program.

In the North Klondike Area, wells NK-MW-01 through NK-MW-05 were installed in February 1990 during the Preliminary Reconnaissance Survey of the Airport/Klondike Area by Westinghouse Environmental and Geotechnical Services, Inc. (Westinghouse). Wells NK-MW-06 and NK-MW-07 were installed in October 1991 during the Site-wide Environmental Monitoring Program. Wells NK-MW-08 through NK-MW-10 were installed in October 1992

during the Environmental Assessment of the Former PCB Storage Building by H&A. Wells NK-MW-12 through NK-MW-17 were installed in about April 1993 during the Klondike Area Site Investigation by Metcalf & Eddy, Inc. (M&E). Two additional monitoring wells, NK-MW-18 and NK-MW-19, were installed in July 1996 by Loureiro Engineering Associates, P.C. (LEA) as part of the most recent investigation activities.

In the South Klondike Area, wells SK-MW-01 through SK-MW-08S and SK-MW-8D were installed in February 1990 during the Preliminary Reconnaissance Survey. Wells SK-MW-09 through SK-MW-13 were installed in October 1991 during the Site-wide Environmental Monitoring Program. Wells SK-MW-14I, SK-MW-15I, and SK-MW-16 were installed in about April 1993 during the Klondike Area Site Investigation. Six additional monitoring wells, SK-MW-18 through SK-MW-24, were installed in August 1996 as part of the most recent investigation activities.

In the South Airport Area, monitoring wells SA-MW-01 and SA-MW-02I were installed in February 1990 during the Preliminary Reconnaissance Survey. Wells SA-MW-03 through SA-MW-05S and SA-MW-05I were installed in October 1991 during the Site-wide Environmental Monitoring Program. In the South Airport Area, piezometers SA-PZ-01 and SA-PZ-02 were installed in November 1991 during the Site-wide Environmental Monitoring Program.

1.3 Scope

This TM presents the water-level measurements conducted from March 1990 through April 1998 in the Airport/Klondike Area of the Main Street facility. The results of the water-level measurements completed in March 1990, September 1996, June 1997, November 1997, and April 1998 are presented in this TM. These water-level measurements were typically performed as part of site-wide groundwater sampling events. For a more detailed account of these groundwater sampling events refer to *Technical Memorandum 3, Groundwater Sampling and Quality.*

These data include historical water-level measurements which do not include all of the current monitoring wells. In some cases, the water-level measurements do not even include all monitoring wells available at that time. In addition, this TM does not address the isolated water-level measurements conducted during other site activities such as well development, well sampling, or aquifer testing. The water-level measurements covered are included to provide a site-wide view of groundwater movement.

The horizontal and vertical coordinates of sampling locations were determined by performing an instrument survey of monitoring wells and soil borings. All of the monitoring wells and some of

the soil boring locations were surveyed. In cases where soil boring locations were not surveyed, the horizontal locations were established by measuring from a known reference point (i.e., building corner or existing soil boring) with a tape measure.

2. METHODOLOGY

This section presents the methods and techniques used for water-level measurements from groundwater monitoring wells and piezometers and for the instrument survey.

2.1 Manual Measurement of Water Levels

Measurement of water levels on a site-wide basis must be performed rapidly to minimize the errors resulting from time-dependent effects, such as recharge from precipitation. The task of measuring water levels was typically performed by LEA personnel in a single day.

For the most recent data, manual water-level measurements were made by LEA personnel in general accordance with the techniques described in the LEA Standard Operating Procedure (SOP) *Liquid Sample Collection and Field Analysis*. Depth to water was measured to the nearest 0.01 foot using an electronic water-level indicator. The depth to water measurements were made relative to the surveyed reference mark for each water-level measurement point (i.e., monitoring well, piezometer, etc.).

Historical water level measurements are also presented in this TM. These data are presented "as-is". Quality assurance and quality control information are not available for the historical water-level measurement data. Also, information on equipment decontamination and waste management practices is typically not presented with historical data reports. The discussions of equipment decontamination and waste management practices presented below are not intended to include reference to historical practices.

2.2 Surveying

Ground surface, top-of-casing (TOC), and top-of-riser (TOR) reference elevations and locations for all water-level measurement points were surveyed to a vertical accuracy of 0.01 feet. Water-level elevations were calculated by subtracting the depth to water from the surveyed reference elevation. The ground surface, TOC, and TOR reference elevations, along with the depth to the top and bottom of the screened interval, for each monitoring well and piezometer are presented in Table 1.

2.3 Equipment Decontamination

Before initiating water-level measurements and between locations, the electronic water-level indicator was decontaminated using a dilute methanol/water solution rinse followed by a rinse

with deionized water. Each rinsing solution was applied by wiping the measuring tape with a saturated, disposable paper towel. The entire decontamination process was performed continuously as the tape was withdrawn from the monitoring well by passing the tape through the towel saturated with the methanol/water solution and then through the towel saturated with deionized water.

2.4 Waste Management

The task of measuring water levels generated small quantities of waste, generally consisting of used surgical gloves and the paper towels used to wipe the water-level indicator. Theses wastes were bagged with other personal protective equipment (PPE) in accordance with LEA SOPs.

2.5 Health and Safety

LEA field personnel conducted the field activities in accordance with the LEA Site Health and Safety Plan that was prepared for all of the investigation activities conducted on the Site. In general, wells were sampled in modified Level D PPE consisting of safety glasses and surgical or nitrile gloves.

3. RESULTS

3.1 Water-Level Measurement

The results of the water-level measurements completed in March 1990, November 1991, September 1996, June 1997, November 1997, and April 1998 are presented in Tables 2 through 7. The location identifiers presented in Tables 2 and 3 includes some that have been modified from those originally used to conform to the location identification protocol currently used at the site.

3.2 Survey Data for Elevations of Groundwater Monitoring Wells

The survey data consisting of easting and northings for monitoring wells, piezometers, and stream gauging locations is listed in Table 1. The data shown in Table 1 includes horizontal location data relative to the Connecticut State Plane Coordinate System.

3.3 Horizontal Groundwater Flow

The horizontal groundwater flow directions within the upper portion of the aquifer in the Airport/Klondike Area for four events, September 1996, June 1997, November 1997, and April 1998, have been inferred from the water-table elevation measurements presented in Table 4 through 7. These data have been used to construct water-table contour maps and are presented as Drawings 1 through 4. These four events were selected for mapping since they included the most comprehensive listing of water-level measurement points.

These data indicate that groundwater flow in the upper aquifer is typically toward the southwest, generally toward the Connecticut River. Local groundwater flow directions are generally consistent with the expected regional groundwater flow direction, but are locally influenced to varying degrees by the presence of Pewterpot Brook and the drainage system beneath Rentschler Airport. As discussed in Section 3.6, Pewterpot Brook appears to be generally a gaining stream, receiving groundwater from the upper aquifer over the reach of the stream where piezometers have been installed.

In the November 1997 water-table contour map, the water-table surface appears to be influenced by relatively high groundwater elevations in the North Airport Area near monitoring well NA-MW-03. This area has historically had an elevated water level and the data from this monitoring well is not typically used in constructing water-table contour maps because the water level is typically above the screened interval of the well.

Aside from the somewhat anomalous water-table contour elevations for November 1997, the groundwater elevation contours for the Airport/Klondike Area appear to be temporally uniform. Seasonal variations are typically manifested only in the absolute water-table elevations, however, the relative elevations remain relatively consistent.

There is insufficient data to review groundwater flow directions in the lower portion of the upper aquifer or in the glaciolacustrine deposits. A more detailed discussion on the site-specific geologic and hydrogeologic conditions encountered and of regional geologic and hydrogeologic conditions as derived from available published information is included in the body of this report.

3.4 Horizontal Groundwater Hydraulic Gradients

The horizontal groundwater gradient is a measure of the driving force behind horizontal groundwater flow. The horizontal hydraulic gradient is the slope, in head loss per unit distance, of the groundwater surface as measured in wells tapping the same aquifer and screened in roughly the same interval. Calculations from the available data indicate that the horizontal hydraulic gradient does not temporally vary significantly in absolute or relative (to the different areas) magnitude.

Based on the available water-level elevation data, horizontal hydraulic groundwater gradients in the eastern Klondike Area range from approximately 0.0064 feet/foot to 0.0075 feet/foot. In the Airport Area, horizontal hydraulic groundwater gradients range from approximately 0.0023 feet/foot to 0.0034 feet/foot.

3.5 Vertical Groundwater Hydraulic Gradients

Vertical groundwater hydraulic gradients measure the driving force behind vertical groundwater flow within an aquifer or between aquifers. Vertical hydraulic gradients in the Airport/ Klondike Area have been calculated from groundwater elevation measurements in monitoring well clusters tapping different portions of the upper aquifer. Monitoring well clusters SK-MW-08S/D, in the South Klondike Area and SA-MW-05S/D in the South Airport Area may be used to estimate vertical hydraulic gradients in the upper aquifer.

Vertical hydraulic gradients calculated from water-level measurements made in 1997 indicate that there is a general downward hydraulic gradient to the groundwater in the upper aquifer in the South Airport and South Klondike Areas. Although no data exist for the North Airport and North Klondike Areas, it is reasonable to assume that the same general downward vertical hydraulic gradients exist as observed in the South Airport and South Klondike Areas.

Vertical hydraulic gradients calculated from the March 1990 data indicate a vertical hydraulic gradient of approximately 0.011 feet/foot downward at monitoring wells SK-MW-08S/D. Vertical hydraulic gradients calculated from the November 1991 data indicate a vertical hydraulic gradient of approximately 0.038 feet/foot downward at monitoring wells SK-MW-08S/D. Vertical hydraulic gradients calculated from the June 1997 data indicate a vertical hydraulic gradient of approximately 0.015 feet/foot downward at monitoring wells SK-MW-08S/D and 0.041 feet/foot downward at monitoring wells SA-MW-05S/I. Vertical hydraulic gradients calculated from the November 1997 data indicate a vertical hydraulic gradient of approximately 0.018 feet/foot downward at monitoring wells SK-MW-08S/D and 0.039 feet/foot downward at monitoring wells SA-MW-05S/I.

3.6 Surface Water/Groundwater Interaction

Surface water groundwater interactions can be estimated by measuring the difference in water levels between the upper aquifer and the surface water body. Three surface water piezometers (SK-PZ-01, SK-PZ-02, and SK-PZ-03) have been installed in Pewterpot Brook in the South Klondike Area. These piezometers begin in the area just west of the Virgin Product Storage Area and continue south to approximately the southeast corner of the airport. These three piezometers allow simultaneous measurement of the stage of Pewterpot Brook and the water table elevation at the same location, and therefore, an estimation of the surface water/groundwater interaction in that area.

Measurements of the stage of the brook and water-table elevation have been made during the water level gauging events of 1997. Data for the June 1997 and November 1997 events is presented in Tables 5 and 6. These data have been used to calculate the apparent direction of groundwater flow between the brook and the upper aquifer.

During both the June 1997 and November 1997 events, the water-level measurements indicate that Pewterpot Brook is a gaining stream in the reach between the Virgin Product Storage Area and SK-PZ-02. That is, the elevation of the water table is higher than the stage of the stream and groundwater would tend to flow from the aquifer into the stream. During the June 1997 event, the data collected from piezometer SK-PZ-03 indicated that the stream was a losing stream in that portion of the stream, but was a gaining stream during the November 1997 gauging event.

TABLES

Table 1
Monitoring Well Construction Data Summary
Airport and Klondike Areas, Pratt & Whitney, East hartford, Connecticut

Location Identifier	Easting	Northing	Reference Elevation (Feet)	Top of Casing Elevation (Feet)	Depth to Top of Screen (Feet)	Depth to Bottom of Screen (Feet)
NA-MW-01	183865.1	150087.8	46.09	46.31	5.30	15.30
NA-MW-02	183169.3	147923.8	43.13	43.35	4.80	14.80
NA-MW-03	184182.5	144746.6	43.06	43.30	4.50	14.50
NA-MW-04	182454.9	146144.6	42.49	42.78	10.30	20.30
NA-MW-05	184855.6	148308.3	47.91		2.25	11.25
NA-MW-06	184617.2	149208.1	47.48		2.00	11.00
NA-MW-07	184335.3	147216.0	48.34		2.25	11.25
NA-MW-19	183073.4	147881.3	42.96			
NA-PZ-01	183755.1	147369.5	42.72	44.11	5.00	10.00
NA-PZ-02	183755.1	147369.5	43.80	44.11	5.00	10.00
NA-PZ-03	182515.6	147279.1	43.19	43.49	5.00	10.00
NA-PZ-04	182888.3	146907.3	41.45	41.66	5.00	10.00
NA-PZ-05	183159.3	146629.3	41.32	41.59	5.00	10.00
NA-PZ-06	183622.3	146232.5	40.80	41.02	5.00	10.00
NA-PZ-07	183979.3	145976.8	43.67	43.94	5.00	10.00
NA-PZ-08	182032.9	146148.7	40.74	40.89	5.00	10.00
NA-PZ-09	182771.4	145889.8	40.48	40.76	5.00	10.00
NA-PZ-10	183206.1	145538.2	43.35	43.63	5.00	10.00
NA-PZ-11	183627.1	145197.7	42.19	42.48	5.00	10.00
NA-PZ-12	184148.7	144778.3	43.13			
NK-MW-01	186195.2	148084.0	55.43	55.76	7.00	12.00
NK-MW-02	185325.7	147796.5	48.40	49.64	5.00	10.00
NK-MW-03	185362.9	148327.7	50.94	51.44	7.00	12.00
NK-MW-04	185331.2	148048.2	46.11	46.69	7.00	12.00
NK-MW-05	184855.6	148308.3	46.65	47.70	4.00	9.00
NK-MW-06	184617.2	149208.1	50.57	50.76	4.00	11.50
NK-MW-07	184335.3	147216.0	47.60	47.78	5.00	12.50
NK-MW-08	184896.6	148429.1	50.96		4.00	11.00
NK-MW-09	184894.5	148385.6	50.43	50.60	4.00	11.00
NK-MW-10	184847.3	148392.2	49.78	49.90	3.50	10.50
NK-MW-11	184550.0	148365.0	46.75	46.75		
NK-MW-12	184223.3	147716.3	46.75		4.50	9.50

Table 1
Monitoring Well Construction Data Summary
Airport and Klondike Areas, Pratt & Whitney, East hartford, Connecticut

Location Identifier	Easting	Northing	Reference Elevation (Feet)	Top of Casing Elevation (Feet)	Depth to Top of Screen (Feet)	Depth to Bottom of Screen (Feet)
NK-MW-13	184459.3	147714.0	50.59		5.00	15.00
NK-MW-14S	184887.7	147770.8	49.32		5.00	10.00
NK-MW-15S	186014.8	147387.9	57.49		2.00	12.00
NK-MW-16	185369.3	148354.0	51.44		3.50	13.50
NK-MW-17	184560.7	148863.6	49.57		4.00	9.00
NK-MW-18	185358.2	148289.4	47.31		1.70	10.70
NK-MW-19	184560.9	148244.5	46.38		1.70	10.70
NK-PZ-01	185328.8	148368.0	46.85			
NK-PZ-02	185339.5	148319.6	46.77			
SA-MW-01	182912.2	144567.5	42.12	42.99	13.00	18.00
SA-MW-02I	181788.5	143840.1	37.04	37.78	15.00	25.00
SA-MW-03	182546.9	144407.3	40.36	40.48	10.00	20.00
SA-MW-04	181919.9	143583.9	38.13	38.31	7.50	17.50
SA-MW-05I	182358.5	143938.4	37.81	38.65	13.50	23.50
SA-MW-05S	182359.7	143932.9	38.07	38.48	4.50	14.50
SA-PZ-01	181881.2	145633.8	39.56	39.76	5.00	10.00
SA-PZ-02	182103.7	145507.9	40.00	40.27	5.00	10.00
SK-MW-01	185636.9	144814.9	50.45	51.22	8.00	13.00
SK-MW-02	185424.2	145840.4	50.18	51.30	9.00	19.00
SK-MW-03	185356.5	145553.5	49.70	49.91	6.00	16.00
SK-MW-04	185636.9	145226.6	50.50	50.81	5.60	15.60
SK-MW-05	184770.0	145767.4	47.19	47.80	6.00	11.00
SK-MW-06	184740.7	146811.2	48.43	48.80	7.00	12.00
SK-MW-07	185172.4	147005.9	51.06	52.19	8.00	13.00
SK-MW-08D	184537.2	145559.5	45.02	45.21	49.00	59.00
SK-MW-08S	184542.3	145560.0	42.92	43.43	7.50	12.50
SK-MW-09	186692.4	146766.8	63.67	64.24	5.00	15.00
SK-MW-10	186235.9	145509.2	55.24	55.52	5.00	15.00
SK-MW-11	185100.2	146080.8	49.58	49.77	5.00	15.00
SK-MW-12	184584.6	146773.0	45.92	46.34	4.50	14.50
SK-MW-13	184869.3	144540.8	42.85	43.15	2.60	12.60
SK-MW-14I	184985.2	145793.7	46.85		10.00	15.00

Table 1
Monitoring Well Construction Data Summary
Airport and Klondike Areas, Pratt & Whitney, East hartford, Connecticut

Location Identifier	Easting	Northing	Reference Elevation (Feet)	Top of Casing Elevation (Feet)	Depth to Top of Screen (Feet)	Depth to Bottom of Screen (Feet)
SK-MW-15I	185236.6	146418.8	49.35		10.00	15.00
SK-MW-16	184352.9	146630.4	45.28		4.50	9.50
SK-MW-19	184607.1	146126.0	48.99		3.50	13.50
SK-MW-20	184672.7	145738.3	50.05		4.00	14.00
SK-MW-21	184710.1	145509.0	47.86		3.50	13.50
SK-MW-22	184748.8	145265.4	47.44		3.00	13.00
SK-MW-23	184573.4	145344.2	46.39		3.00	13.00
SK-MW-24	184824.5	146376.8	49.15		3.00	13.00

Notes: All depth measurements are given in feet below ground surface, except as noted.
All elevations are given in feet above mean sea level.
Top of casing elevation indicates the elevation of the cover of the protective casing.
Top of riser elevation indicates the elevation of the measurement reference point on well riser.

Table 2
Water-Level Elevations, March 28, 1990
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
NK-MW-01	7-12	55.43	5.35	**50.08**		
NK-MW-02I	5-10	49.64	5.04	**44.60**		
NK-MW-03	7-12	50.94	5.87	**45.07**		
NK-MW-04	7-12	46.11	1.53	**44.58**		
NK-MW-05	5-10	47.67	7.23	**40.44**		
SA-MW-01	13-18	42.12	9.99	**32.13**		
SK-MW-01	8-13	51.22	8.26	**42.96**		
SK-MW-02I	9-19	51.30	4.39	**46.91**		
SK-MW-03I	6-16	49.70	3.57	**46.13**		
SK-MW-04I	5.6-15.6	50.81	4.10	**46.71**		
SK-MW-05	6-11	47.80	7.75	**40.05**		
SK-MW-06	7-12	48.43	6.41	**42.02**		
SK-MW-07I	8-13	52.19	8.67	**43.52**		
SK-MW-08D	49-59	45.02	9.42	**35.60**		
SK-MW-08S	7.5-12.5	42.92	5.67	**37.25**		

Notes: Shaded regions indicate values that were used to create groundwater contours.
NR means Not Recorded.

Table 3
Water-Level Elevations, November 20, 1991
Airport/klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
ET-PZ-01	5-10[a]	42.30				
NA-MW-01	5.3-15.3	46.09	4.80	41.29		
NA-MW-02	4.8-14.8	43.13	3.70	39.43		
NA-MW-03	4.5-14.5	43.06	4.60	38.46		
NA-MW-04	10.3-20.3	42.49	5.95	36.54		
NA-MW-05	2.3-11.3	47.91				
NA-MW-06	2-11	47.48				
NA-MW-07	2.3-11.3	48.34				
NA-PZ-01	5-10[a]	42.72				
NA-PZ-02	5-10	43.80				
NA-PZ-03	5-10	43.19				
NA-PZ-04	5-10	41.45				
NA-PZ-05	5-10	41.32				
NA-PZ-06	5-10	40.80				
NA-PZ-07	5-10	43.67				
NA-PZ-08	5-10	40.74				
NA-PZ-09	5-10	40.48				
NA-PZ-10	5-10	43.35				
NA-PZ-11	5-10	42.19				
NA-PZ-12	5-10[a]	43.13				
NK-MW-01	7-12	55.43	5.94	49.49		
NK-MW-02	5-10	48.40	3.88	44.52		
NK-MW-03	7-12	50.94	5.88	45.06		
NK-MW-04	7-12	46.11	1.60	44.51		
NK-MW-05	5-10	46.65	6.44	40.21		
NK-MW-06	4.4-11.5	50.58	6.38	44.20		
NK-MW-07	5-12.5	47.60	10.24	37.36		
NK-MW-08	4-11	51.01				
NK-MW-09	4-11	50.76				
NK-MW-10	3.5-10.5	49.80				
NK-MW-11		46.75				
NK-MW-12	4.5-9.5	46.41				
NK-MW-13	5-15	50.49				
NK-MW-14	5-10	49.09				
NK-MW-15	2-12	57.35				
NK-MW-16	3.5-13.5	51.25				
NK-MW-17	4-9	49.57				
NK-MW-18	1.7-10.7	47.31				
NK-MW-19	1.7-10.7	46.38				
NK-PZ-01	NA	46.85				
NK-PZ-02	NA	46.77				
NK-SG-01	NA	38.33				
NK-SG-02	NA	38.97				
NK-SG-03	NA	41.45				
NK-SG-04[b]	NA	46.54				
SA-MW-01	13-18	42.12	9.75	32.37		
SA-MW-02I	15-25	37.04	12.45	24.59		
SA-MW-03	10-20	40.36	12.57	27.79		
SA-MW-04	7.5-17.5	38.13	11.16	26.97		
SA-MW-05I	13.5-23.5	37.81	9.32	28.49		
SA-MW-05S	4.5-14.5	38.07	9.29	28.78		
SA-PZ-01	5-10	39.56				

Table 3
Water-Level Elevations, November 20, 1991
Airport/klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
SA-PZ-02	5-10	40.00				
SK-MW-01	8-13	50.45	9.51	40.94		
SK-MW-02	9-19	50.18	6.76	43.42		
SK-MW-03	6-16	49.70	6.93	42.77		
SK-MW-04	5.6-15.6	50.50	6.71	43.79		
SK-MW-05	6-11	47.19	8.30	38.89		
SK-MW-06	7-12	48.43	7.25	41.18		
SK-MW-07	8-13	51.06	8.17	42.89		
SK-MW-08D	49-59	45.02	8.32	36.70		
SK-MW-08S	7.5-12.5	42.92	5.73	37.19		
SK-MW-09	5-15	63.67	9.00	54.67		
SK-MW-10	5-15	55.24	9.83	45.41		
SK-MW-11	5-15	49.58	7.88	41.70		
SK-MW-12	4.5-14.5	45.92	5.90	40.02		
SK-MW-13	2.6-12.6	42.85	6.10	36.75		
SK-MW-14I	10-15	46.85				
SK-MW-15I	10-15	49.35				
SK-MW-16	4.5-9.5	45.28				
SK-MW-19	3.5-13.5	48.99				
SK-MW-20	4-14	50.05				
SK-MW-21	3.5-13.5	47.86				
SK-MW-22	3-13	47.44				
SK-MW-23	3-13	46.39				
SK-MW-24	3-13	49.15				
SK-SG-01	NA	40.59				
SK-SG-02	NA	41.03				
SK-SG-03	NA	40.84				
SK-SG-04	NA	41.01				
SK-SG-05	NA	41.04				
SK-SG-06	NA	39.88				
SK-SG-07	NA	40.83				
SK-SG-08	NA	41.15				
SK-SG-09	NA	42.61				

Notes:

Shaded regions indicate values that were used to create groundwater contours.

[a] denotes assumed screened interval.

NR means Not Recorded.

DNF means did not find.

NA means Not Applicable.

[b] denotes same location as NK-PZ-02.

Table 4
Water-Level Elevations, September , 1996
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
ET-PZ-01	5-10[a]	42.30				
NA-MW-01	5.3-15.3	46.09				
NA-MW-02	4.8-14.8	43.13				
NA-MW-03	4.5-14.5	43.06				
NA-MW-04	10.3-20.3	42.49				
NA-MW-05	2.3-11.3	47.91				
NA-MW-06	2-11	47.48				
NA-MW-07	2.3-11.3	48.34				
NA-PZ-01	5-10[a]	42.72				
NA-PZ-02	5-10	43.80				
NA-PZ-03	5-10	43.19				
NA-PZ-04	5-10	41.45				
NA-PZ-05	5-10	41.32				
NA-PZ-06	5-10	40.80				
NA-PZ-07	5-10	43.67				
NA-PZ-08	5-10	40.74				
NA-PZ-09	5-10	40.48				
NA-PZ-10	5-10	43.35				
NA-PZ-11	5-10	42.19				
NA-PZ-12	5-10[a]	43.13				
NK-MW-01	7-12	55.43	8.09	47.34		
NK-MW-02	5-10	48.40	4.33	44.07		
NK-MW-03	7-12	50.94	6.39	44.55		
NK-MW-04	7-12	46.11	2.28	43.83		
NK-MW-06	4-11.5	50.58	7.74	42.84		
NK-MW-07	5-12.5	47.60	0.10	37.50		
NK-MW-08	4-11	51.01	8.86	42.15		
NK-MW-09	4-11	50.76	8.21	42.55		
NK-MW-10	3.5-10.5	49.80	8.12	41.68		
NK-MW-11		46.75	7.21	39.54		
NK-MW-12	4.5-9.5	46.41	8.65	37.76		
NK-MW-13	5-15	50.49	12.10	38.39		
NK-MW-14	5-10	49.09	8.61	40.48		
NK-MW-15	2-12	57.35	6.27	51.08		
NK-MW-16	3.5-13.5	51.25	6.57	44.68		
NK-MW-17	4-9	49.57				
NK-MW-18	1.7-10.7	47.31	4.02	43.29		
NK-MW-19	1.7-10.7	46.38	6.56	39.82		
NK-PZ-01	NA	46.85				
NK-PZ-02	NA	46.77				
NK-SG-01	NA	38.33				
NK-SG-02	NA	38.97				
NK-SG-03	NA	41.45				
NK-SG-04	NA	46.54				
SA-MW-01	13-18	42.12	9.52	32.60		
SA-MW-02I	15-25	37.04				
SA-MW-03	10-20	40.36	10.06	30.30		
SA-MW-04	7.5-17.5	38.13	11.04	27.09		
SA-MW-05I	13.5-23.5	37.81				
SA-MW-05S	4.5-14.5	38.07	9.17	28.90		
SA-PZ-01	5-10	39.56				
SA-PZ-02	5-10	40.00				

Table 4

Water-Level Elevations, September , 1996

Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
SK-MW-01	8-13	50.45	10.12	40.33		
SK-MW-02	9-19	50.18	7.87	42.31		
SK-MW-03	6-16	49.70	8.25	41.45		
SK-MW-04	5.6-15.6	50.50	7.90	42.60		
SK-MW-05	6-11	47.19	8.58	38.61		
SK-MW-06	7-12	48.43	8.29	40.14		
SK-MW-07	8-13	51.06	9.42	41.64		
SK-MW-08D	49-59	45.02				
SK-MW-08S	7.5-12.5	42.92	6.02	36.90		
SK-MW-09	5-15	63.67	9.58	54.09		
SK-MW-10	5-15	55.24	10.38	44.86		
SK-MW-11	5-15	49.58	8.78	40.80		
SK-MW-12	4.5-14.5	45.92	6.62	39.30		
SK-MW-13	2.6-12.6	42.85	6.36	36.49		
SK-MW-14I	10-15	46.85				
SK-MW-15I	10-15	49.35				
SK-MW-16	4.5-9.5	45.28	7.15	38.13		
SK-MW-19	3.5-13.5	48.99	10.19	38.80		
SK-MW-20	4-14	50.05	12.02	38.03		
SK-MW-21	3.5-13.5	47.86	10.75	37.11		
SK-MW-22	3-13	47.44	10.42	37.02		
SK-MW-23	3-13	46.39	9.69	36.70		
SK-MW-24	3-13	49.15	9.12	40.03		
SK-PZ-01	NA	40.59				
SK-PZ-02	NA	41.03				
SK-PZ-03	NA	40.84				
SK-SG-04	NA	41.01				
SK-SG-05	NA	41.04				
SK-SG-06	NA	39.88				
SK-SG-07	NA	40.83				
SK-SG-08	NA	41.15				
SK-SG-09	NA	42.61				

Notes:

Shaded regions indicate values that were used to create groundwater contours.

[a] denotes assumed screened interval.

NR means Not Recorded.

DNF means did not find.

NA means Not Applicable.

[b] denotes same location as NK-PZ-02.

Table 5

Water-Level Elevations, June 2, 1997

Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
ET-PZ-01	5-10[a]	42.30	2.82	39.48		
NA-MW-01	5.3-15.3	46.09	4.80	41.29		
NA-MW-02	4.8-14.8	43.13	3.75	39.38		
NA-MW-03	4.5-14.5	43.06	4.23	38.83		
NA-MW-04	10.3-20.3	42.49	5.30	37.19		
NA-MW-05	2.3-11.3	47.91	7.77	40.14		
NA-MW-06	2-11	47.48	7.44	40.04		
NA-MW-07	2.3-11.3	48.34	8.32	40.02		
NA-PZ-01	5-10[a]	42.72	NR			
NA-PZ-02	5-10	43.80	5.79	38.01		
NA-PZ-03	5-10	43.19	4.39	38.80		
NA-PZ-04	5-10	41.45	3.40	38.05		
NA-PZ-05	5-10	41.32	NR			
NA-PZ-06	5-10	40.80	NR			
NA-PZ-07	5-10	43.67	4.89	38.78		
NA-PZ-08	5-10	40.74	5.49	35.25		
NA-PZ-09	5-10	40.48	NR			
NA-PZ-10	5-10	43.35	NR			
NA-PZ-11	5-10	42.19	NR			
NA-PZ-12	5-10[a]	43.13	NR			
NK-MW-01	7-12	55.43	8.50	46.93		
NK-MW-02	5-10	48.40	3.92	44.48		
NK-MW-03	7-12	50.94	5.77	45.17		
NK-MW-04	7-12	46.11	1.71	44.40		
NK-MW-06	4-11.5	50.58	6.63	43.95		
NK-MW-07	5-12.5	47.60	9.32	38.28		
NK-MW-08	4-11	51.01	8.63	42.38		
NK-MW-09	4-11	50.76	8.51	42.25		
NK-MW-10	3.5-10.5	49.80	7.90	41.90		
NK-MW-11		46.75	6.19	40.56		
NK-MW-12	4.5-9.5	46.41	8.02	38.39		
NK-MW-13	5-15	50.49	11.44	39.05		
NK-MW-14	5-10	49.09	8.51	40.58		
NK-MW-15	2-12	57.35	4.38	52.97		
NK-MW-16	3.5-13.5	51.25	5.95	45.30		
NK-MW-17	4-9	49.57	7.05	42.52		
NK-MW-18	1.7-10.7	47.31	2.45	44.86		
NK-MW-19	1.7-10.7	46.38	5.99	40.39		
NK-PZ-01	NA	46.85	NR			
NK-PZ-02	NA	46.77	NR			
NK-SG-01	NA	38.33	NA		0.18	**38.15**
NK-SG-02	NA	38.97	NA		0.57	**38.40**
NK-SG-03	NA	41.45	NA		1.25	**40.20**
NK-SG-04	NA	46.54	NA		1.85	**44.69**
SA-MW-01	13-18	42.12	8.28	33.84		
SA-MW-02I	15-25	37.04	10.75	26.29		
SA-MW-03	10-20	40.36	8.75	31.61		
SA-MW-04	7.5-17.5	38.13	10.41	27.72		
SA-MW-05I	13.5-23.5	37.81	8.52	29.29		
SA-MW-05S	4.5-14.5	38.07	8.45	29.62		
SA-PZ-01	5-10	39.56	5.59	33.97		

Table 5
Water-Level Elevations, June 2, 1997
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
SA-PZ-02	5-10	40.00				
SK-MW-01	8-13	50.45	7.90	42.55		
SK-MW-02	9-19	50.18	3.70	46.48		
SK-MW-03	6-16	49.70	4.05	45.65		
SK-MW-04	5.6-15.6	50.50	4.85	45.65		
SK-MW-05	6-11	47.19	7.10	40.09		
SK-MW-06	7-12	48.43	6.65	41.78		
SK-MW-07	8-13	51.06	7.58	43.48		
SK-MW-08D	49-59	45.02	8.37	36.65		
SK-MW-08S	7.5-12.5	42.92	5.60	37.32		
SK-MW-09	5-15	63.67	6.56	57.11		
SK-MW-10	5-15	55.24	9.07	46.17		
SK-MW-11	5-15	49.58	5.74	43.84		
SK-MW-12	4.5-14.5	45.92	5.35	40.57		
SK-MW-13	2.6-12.6	42.85	5.60	37.25		
SK-MW-14I	10-15	46.85	4.90	41.95		
SK-MW-15I	10-15	49.35	4.72	44.63		
SK-MW-16	4.5-9.5	45.28	6.80	38.48		
SK-MW-19	3.5-13.5	48.99	9.05	39.94		
SK-MW-20	4-14	50.05	11.02	39.03		
SK-MW-21	3.5-13.5	47.86	9.60	38.26		
SK-MW-22	3-13	47.44	9.37	38.07		
SK-MW-23	3-13	46.39	9.20	37.19		
SK-MW-24	3-13	49.15	7.25	41.90		
SK-PZ-01	NA	40.59	3.41	37.18	3.66	36.93
SK-PZ-02	NA	41.03	4.28	36.75	4.51	36.52
SK-PZ-03	NA	40.84	4.01	36.83	4.48	36.36
SK-SG-04	NA	41.01			4.93	36.08
SK-SG-05	NA	41.04			4.06	36.98
SK-SG-06	NA	39.88			1.37	38.51
SK-SG-07	NA	40.83			2.48	38.35
SK-SG-08	NA	41.15			2.81	38.34
SK-SG-09	NA	42.61			4.32	38.29

Notes:

Shaded regions indicate values that were used to create groundwater contours.

[a] denotes assumed screened interval.

NR means Not Recorded.

DNF means did not find.

NA means Not Applicable.

[b] denotes same location as NK-PZ-02.

Table 6
Water-Level Elevations, November 17, 1997
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
ET-PZ-01	5-10[a]	42.30	2.62	**39.68**		
NA-MW-01	5.3-15.3	46.09	4.93	**41.16**		
NA-MW-02	4.8-14.8	43.13	3.37	**39.76**		
NA-MW-03	4.5-14.5	43.06	4.62	**38.44**		
NA-MW-04	10.3-20.3	42.49	6.05	**36.44**		
NA-MW-05	2.3-11.3	47.91	8.05	**39.86**		
NA-MW-06	2-11	47.48	7.65	**39.83**		
NA-MW-07	2.3-11.3	48.34	8.40	**39.94**		
NA-PZ-01	5-10[a]	42.72	3.01	**39.71**		
NA-PZ-02	5-10	43.80	5.58	**38.22**		
NA-PZ-03	5-10	43.19	4.89	**38.30**		
NA-PZ-04	5-10	41.45	3.28	**38.17**		
NA-PZ-05	5-10	41.32	DNF			
NA-PZ-06	5-10	40.80	4.75	**36.05**		
NA-PZ-07	5-10	43.67	5.36	**38.31**		
NA-PZ-08	5-10	40.74	5.75	**34.99**		
NA-PZ-09	5-10	40.48	5.70	**34.78**		
NA-PZ-10	5-10	43.35	4.72	**38.63**		
NA-PZ-11	5-10	42.19	3.88	**38.31**		
NA-PZ-12	5-10[a]	43.13	4.80	**38.33**		
NK-MW-01	7-12	55.43	6.34	**49.09**		
NK-MW-02	5-10	48.40	4.02	**44.38**		
NK-MW-03	7-12	50.94	5.73	**45.21**		
NK-MW-04	7-12	46.11	1.60	**44.51**		
NK-MW-06	4-11.5	50.58	7.24	**43.34**		
NK-MW-07	5-12.5	47.60	9.97	**37.63**		
NK-MW-08	4-11	51.01	8.53	**42.48**		
NK-MW-09	4-11	50.76	8.40	**42.36**		
NK-MW-10	3.5-10.5	49.80	7.78	**42.02**		
NK-MW-11		46.75	6.92	**39.83**		
NK-MW-12	4.5-9.5	46.41	8.54	**37.87**		
NK-MW-13	5-15	50.49	12.01	**38.48**		
NK-MW-14	5-10	49.09	8.40	**40.69**		
NK-MW-15	2-12	57.35	7.21	**50.14**		
NK-MW-16	3.5-13.5	51.25	5.94	**45.31**		
NK-MW-17	4-9	49.57	7.92	**41.65**		
NK-MW-18	1.7-10.7	47.31	2.45	**44.86**		
NK-MW-19	1.7-10.7	46.38	6.69	**39.69**		
NK-PZ-01	NA	46.85	2.13	44.72	2.10	**44.75**
NK-PZ-02	NA	46.77	2.06	44.71		**44.66**
NK-SG-01	NA	38.33			1.03	**37.30**
NK-SG-02	NA	38.97			1.57	**37.40**
NK-SG-03	NA	41.45			1.26	**40.19**
NK-SG-04[b]	NA	46.54			1.88	**44.66**
SA-MW-01	13-18	42.12	9.16	32.96		
SA-MW-02I	15-25	37.04	10.34	26.70		
SA-MW-03	10-20	40.36	9.09	31.27		
SA-MW-04	7.5-17.5	38.13	10.65	27.48		
SA-MW-05I	13.5-23.5	37.81	8.19	29.62		
SA-MW-05S	4.5-14.5	38.07	8.14	29.93		
SA-PZ-01	5-10	39.56	5.46	34.10		
SA-PZ-02	5-10	40.00	5.71	34.29		

Table 6
Water-Level Elevations, November 17, 1997
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
SK-MW-01	8-13	50.45	10.65	39.80		
SK-MW-02	9-19	50.18	8.48	41.70		
SK-MW-03	6-16	49.70	8.64	41.06		
SK-MW-04	5.6-15.6	50.50	8.19	42.31		
SK-MW-05	6-11	47.19	8.41	38.78		
SK-MW-06	7-12	48.43	8.09	40.34		
SK-MW-07	8-13	51.06	9.02	42.04		
SK-MW-08D	49-59	45.02	8.29	36.73		
SK-MW-08S	7.5-12.5	42.92	5.41	37.51		
SK-MW-09	5-15	63.67	10.37	53.30		
SK-MW-10	5-15	55.24	10.27	44.97		
SK-MW-11	5-15	49.58	8.50	41.08		
SK-MW-12	4.5-14.5	45.92	6.29	39.63		
SK-MW-13	2.6-12.6	42.85	5.88	36.97		
SK-MW-14I	10-15	46.85	7.03	39.82		
SK-MW-15I	10-15	49.35	7.54	41.81		
SK-MW-16	4.5-9.5	45.28	6.78	38.50		
SK-MW-19	3.5-13.5	48.99	9.88	39.11		
SK-MW-20	4-14	50.05	11.88	38.17		
SK-MW-21	3.5-13.5	47.86	10.79	37.07		
SK-MW-22	3-13	47.44	10.16	37.28		
SK-MW-23	3-13	46.39	9.20	37.19		
SK-MW-24	3-13	49.15	8.78	40.37		
SK-SG-01	NA	40.59	3.49	37.10	3.68	**36.91**
SK-SG-02	NA	41.03	4.25	36.78	4.48	**36.55**
SK-SG-03	NA	40.84	4.25	36.59	4.44	**36.40**
SK-SG-04	NA	41.01			4.88	**36.13**
SK-SG-05	NA	41.04			4.11	**36.93**
SK-SG-06	NA	39.88			1.48	**38.40**
SK-SG-07	NA	40.83			2.76	**38.07**
SK-SG-08	NA	41.15			3.35	**37.80**
SK-SG-09	NA	42.61			5.35	**37.26**

Notes:

Shaded regions indicate values that were used to create groundwater contours.

[a] denotes assumed screened interval.

NR means Not Recorded.

DNF means did not find.

NA means Not Applicable.

[b] denotes same location as NK-PZ-02.

Table 7
Water-Level Elevations, April 22, 1998
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
ET-PZ-01	5-10[a]	42.30	1.90	**40.40**		
NA-MW-01	5.3-15.3	46.09	5.24	**40.85**		
NA-MW-02	4.8-14.8	43.13	3.20	**39.93**		
NA-MW-03	4.5-14.5	43.06	3.45	**39.61**		
NA-MW-04	10.3-20.3	42.49	4.83	**37.66**		
NA-MW-05	2.3-11.3	47.91	7.26	**40.65**		
NA-MW-06	2-11	47.48	6.90	**40.58**		
NA-MW-07	2.3-11.3	48.34	7.63	**40.71**		
NA-PZ-01	5-10[a]	42.72	2.77	**39.95**		
NA-PZ-02	5-10	43.80	5.53	**38.27**		
NA-PZ-03	5-10	43.19	3.67	**39.52**		
NA-PZ-04	5-10	41.45	2.93	**38.52**		
NA-PZ-05	5-10	41.32	2.71	**38.61**		
NA-PZ-06	5-10	40.80	4.39	**36.41**		
NA-PZ-07	5-10	43.67	4.00	**39.67**		
NA-PZ-08	5-10	40.74	4.90	**35.84**		
NA-PZ-09	5-10	40.48	4.73	**35.75**		
NA-PZ-10	5-10	43.35	4.75	**38.60**		
NA-PZ-11	5-10	42.19	3.17	**39.02**		
NA-PZ-12	5-10[a]	43.13	3.47	**39.66**		
NK-MW-01	7-12	55.43	3.37	**52.06**		
NK-MW-02	5-10	48.40	3.64	**44.76**		
NK-MW-03	7-12	50.94	5.61	**45.33**		
NK-MW-04	7-12	46.11	1.25	**44.86**		
NK-MW-06	4-11.5	50.58	6.20	**44.38**		
NK-MW-07	5-12.5	47.60	9.65	**37.95**		
NK-MW-08	4-11	51.01	8.54	**42.47**		
NK-MW-09	4-11	50.76	8.37	**42.39**		
NK-MW-10	3.5-10.5	49.80	7.73	**42.07**		
NK-MW-11		46.75	5.97	**40.78**		
NK-MW-12	4.5-9.5	46.41	8.14	**38.27**		
NK-MW-13	5-15	50.49	11.44	**39.05**		
NK-MW-14	5-10	49.09	8.42	**40.67**		
NK-MW-15	2-12	57.35	5.27	**52.08**		
NK-MW-16	3.5-13.5	51.25	8.82	**42.43**		
NK-MW-17	4-9	49.57	6.56	**43.01**		
NK-MW-18	1.7-10.7	47.31	2.15	**45.16**		
NK-MW-19	1.7-10.7	46.38	5.85	**40.53**		
NK-PZ-01	NA	46.85	1.95	**44.90**		
NK-PZ-02	NA	46.77	2.03	**44.74**		
NK-SG-01	NA	38.33			0.60	**37.73**
NK-SG-02	NA	38.97			1.12	**37.85**
NK-SG-03	NA	41.45			1.26	**40.19**
NK-SG-04[b]	NA	46.54				
SA-MW-01	13-18	42.12	7.94	**34.18**		
SA-MW-02I	15-25	37.04	10.33	**26.71**		
SA-MW-03	10-20	40.36	8.97	**31.39**		
SA-MW-04	7.5-17.5	38.13	9.95	**28.18**		
SA-MW-05I	13.5-23.5	37.81	7.61	**30.20**		
SA-MW-05S	4.5-14.5	38.07	7.26	**30.81**		
SA-PZ-01	5-10	39.56	4.88	**34.68**		
SA-PZ-02	5-10	40.00	4.98	**35.02**		

Table 7
Water-Level Elevations, April 22, 1998
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location Identifier	Screened Interval (ft)	Reference Elevation (ft)	Depth to Groundwater (ft)	Elevation of Groundwater (ft)	Depth to Surface Water (ft)	Elevation of Surface Water (ft)
SK-MW-01	8-13	50.45	6.95	43.50		
SK-MW-02	9-19	50.18	2.55	47.63		
SK-MW-03	6-16	49.70	2.70	47.00		
SK-MW-04	5.6-15.6	50.50	3.25	47.25		
SK-MW-05	6-11	47.19	6.08	41.11		
SK-MW-06	7-12	48.43	5.89	42.54		
SK-MW-07	8-13	51.06	7.12	43.94		
SK-MW-08D	49-59	45.02	8.09	36.93		
SK-MW-08S	7.5-12.5	42.92	4.77	38.15		
SK-MW-09	5-15	63.67	5.60	58.07		
SK-MW-10	5-15	55.24	8.53	46.71		
SK-MW-11	5-15	49.58	4.28	45.30		
SK-MW-12	4.5-14.5	45.92	4.89	41.03		
SK-MW-13	2.6-12.6	42.85	4.41	38.44		
SK-MW-14I	10-15	46.85	NA			
SK-MW-15I	10-15	49.35	3.67	45.68		
SK-MW-16	4.5-9.5	45.28	6.55	38.73		
SK-MW-19	3.5-13.5	48.99	8.18	40.81		
SK-MW-20	4-14	50.05	10.15	39.90		
SK-MW-21	3.5-13.5	47.86	8.49	39.37		
SK-MW-22	3-13	47.44	8.12	39.32		
SK-MW-23	3-13	46.39	7.97	38.42		
SK-MW-24	3-13	49.15	6.31	42.84		
SK-SG-01	NA	40.59	3.00	37.59		
SK-SG-02	NA	41.03	3.38	37.65		
SK-SG-03	NA	40.84	2.90	37.94		
SK-SG-04	NA	41.01			4.32	**36.69**
SK-SG-05	NA	41.04			3.63	**37.41**
SK-SG-06	NA	39.88			1.56	**38.32**
SK-SG-07	NA	40.83			2.60	**38.23**
SK-SG-08	NA	41.15			3.35	**37.80**
SK-SG-09	NA	42.61			4.86	**37.75**

Notes:

Shaded regions indicate values that were used to create groundwater contours.

[a] denotes assumed screened interval.

NR means Not Recorded.

DNF means did not find.

NA means Not Applicable.

[b] denotes same location as NK-PZ-02.

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DRAFT

TECHNICAL MEMORANDUM 4
BACKGROUND SOIL SAMPLING AND ANALYSIS

SUMMARY
SITE INVESTIGATION AND REMEDIATION REPORT
AIRPORT/KLONDIKE AREA
AT
PRATT & WHITNEY
EAST HARTFORD, CONNECTICUT
EPA ID No. CTD990672081

Prepared for:

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LEA Comm. No. 68V8124

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ATTACHMENTS

Acronyms

AEL	Averill Environmental Laboratory, Inc.
CFR	Code of Federal Regulations
DEP	State of Connecticut Department of Environmental Protection
DPH	State of Connecticut Department of Public Health
FID	Flame-Ionization Detector
F&O	Fuss & O'Neill, Inc.
H&A	Haley & Aldrich, Inc.
LEA	Loureiro Engineering Associates, P.C.
M&E	Metcalf & Eddy, Inc.
NTU	Nephelometric Turbidity Unit
P&W	Pratt & Whitney
PETG	Polyethylene terephthalate copolyester
PID	Photo-Ionization Detector
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QUANT	Quanterra Environmental Services, Inc.
RCSA	Regulations of Connecticut State Agencies
SCS	US Soil Conservation Service
SOP	Standard Operating Procedure
TM	Technical Memoranda
VOC	Volatile Organic Compound

1. INTRODUCTION

1.1 Purpose and Objective

This Technical Memorandum (TM) presents the methodology and results of the soil background metals sampling and analysis methodologies used in the Airport/Klondike Area (the Site) of the Pratt & Whitney (P&W) facility located at 400 Main Street (Main Street facility) in the Town of East Hartford, Connecticut. Background soil metals data were collected from undisturbed areas of the North Klondike, as part of the remediation of the X-194 Test Stand in the North Klondike Area, to characterize the nature and distribution of natural metals in the unconsolidated materials at the Site. Additionally, background soil metals data for glaciolacustrine sediment samples were obtained from soil borings selected from portions of the Airport/Klondike Area where contamination was not identified in the overlying soils.

1.2 Background

The Airport/Klondike Area is located on the eastern portion of the P&W Main Street facility on the east side of the main plant, north of Brewer Street and south of Silver Lane. The Airport/Klondike Area consists of four study areas that include the North and South Airport Areas and the North and South Klondike Areas. Previous investigations at the Site performed from 1990 through 1997, as area-specific investigations and site-wide investigations related to environmental conditions, have resulted in the installation of numerous soil borings, monitoring wells, and surficial soil samples throughout the Airport/Klondike Area.

During the remediation activities associated with the X-194 Test Stand in the North Klondike, soil samples were collected in portions of the North Klondike from reportedly undisturbed areas and areas that have been disturbed, but never used for industrial activities. The X-194 Test Stand was used for the testing of beryllium-based fuels. Therefore, as part of establishing target clean-up levels for the remediation activities, the background concentration of beryllium had to be determined. Analyses for background concentrations in soil were conducted for all of the metals listed in Title 40 of the Code of Federal Regulations, Part 261, Appendix IX (40 CFR 261 Appendix IX). The Appendix IX metals include antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, tin, vanadium, and zinc, and additionally aluminum, silicon, and sodium.

As part of the most recent site investigation activities, soil borings were installed throughout the Airport/Klondike Area. Analytical data and historical operations information associated with

these selected soil boring locations indicated that these borings were located upgradient of potential contaminant release area. Samples from these soil borings of the underlying glaciolacustrine sediment, generally referred to as clay, were submitted for laboratory analysis of metals. Data from this site characterization has been used as sitewide background data for the current site investigation activities throughout the Airport/Klondike Area.

1.3 Scope

This TM covers the sampling and analyses of the background soil samples collected during the investigation and remediation of the X-194 Test Stand for the period 1993 through 1994, and glaciolacustrine sediment samples collected during various soil boring programs for the period from 1992 through 1997. This TM describes the soil sampling and analytical methods, the analytical results, and the statistical analysis of the data, and the development of background soils metals concentrations.

1.4 General Geologic and Hydrogeologic Conditions

The geologic and hydrogeologic characteristics of the Site are discussed in detail in the main body of this report. In general, the surficial materials in which the majority of the monitoring wells are screened, consist of medium to fine grained sands with trace levels of fine gravels and coarse sands. These sediments are generally post-glacial, fluvial deposits associated with the Connecticut River, although in many places the upper portion of these sediments have been anthropogenically disturbed during on-site construction activities. Beneath the fluvial sediments are glaciolacustrine sediments, primarily laminated silts and clays, associated with glacial Lake Hitchcock. The basal sediment layer over most of the area is glacial till and stratified drift. Bedrock in the general East Hartford area consists of Triassic Age, interbedded arkoses and basalts. Bedrock in the area has a general slight dip eastward cut by widespread steep faults.

The regional drainage basin is the Upper Connecticut River Basin. Regional flow in the unconsolidated materials in this part of the basin is to the west, towards the Connecticut River. Local groundwater flow is also controlled to some extent by local drainage sub-basins and topography. The upper portion of the unconsolidated sediments serves as the primary aquifer in the area. Groundwater flow in the bedrock is primarily within fractures and fault planes, and to a lesser extent within the rock matrix. The local bedrock aquifer would be adequate as a residential water supply source, but groundwater yields are typically too low to be of commercial or industrial use.

1.5 Soil Types

Soils within the Airport/Klondike Area were mapped by the US Soil Conservation Service (SCS) in the 1950s. At that time, the soils at the Site were mapped by the SCS as Made Land, Ninigret Fine Sandy Loam, Windsor Series Loamy Fine Sand, the Walpole Series Loam, the Saco Series Loam, and the Sudbury Series Fine Sandy Loam. The distribution of soil types, as mapped by the SCS (1962), is shown on Drawing TM4-1. These soil types are described by the SCS (1962) as follows.

> **Made Land** *Made land occurs where the surface soil and subsoil have been stripped, and where earth, trash, or both, are used as fill material. It also occurs where sand and gravel have been removed and the unwanted material was left in ridges or mounds. Made land also includes areas where the soil profiles have been disturbed through leveling or other means.*

Ninigret Series The Ninigret Series consists of moderately well drained to somewhat poorly drained soils. These soils are typically coarse to medium textured and are typically developed on glaciolacustrine, glaciofluvial, and stream terrace deposits. These soils have developed from sediments derived from both crystalline rocks and the Triassic shales and sandstones.

> **Ninigret Series Fine Sandy Loam** *(0 to 3 percent slopes) This soil has a light fine sandy loam and sandy loam surface soil and upper subsoil. It is rapidly permeable above the seasonal high water table and has a moderate moisture holding capacity. Because the texture is coarser, it dries out faster in spring than Ninigret very fine sandy loam, 0 to 3 percent slopes. Small areas of loamy fine sand are included with this soil type.*
>
> *About 25 percent of the acreage is in forest. Cleared areas are used mainly for tobacco, potatoes, hay, and pasture. Some of the acreage is used for silage corn, sweet corn, vegetables, nursery stock, and alfalfa. Without drainage, the soil generally is suited to silage corn, late vegetables, hay, and pasture. Fully drained or partly drained areas are suitable for tobacco, potatoes, and general crops. However, tobacco and potatoes are subject to damage in very wet seasons during the summer. Fertilizers are needed to produce high yields. Applied plant nutrients, however, leach out fairly rapidly. This soil requires management that will maintain the supply of organic matter and good tilth.*

Saco Series The Saco Series consists of frequently flooded, very poorly drained soils on flood plains. These soils, which generally occur in slight depressions that border terrace escarpments or uplands, in old oxbows and narrow floodplains, generally has a dark gray to black silt loam to loamy sand surface. The subsurface of Saco Series soils is generally mottled with gray. Water may stand on the surface of these soils for long periods during the winter and spring.

> **Saco Silt Loam** *(0 to 3 percent slopes) This soil is used mainly for forest, unimproved pasture, and wildlife because it is very poorly drained and frequently flooded. Unimproved pastures furnish some grazing in dry seasons. Drainage is generally not practical because of frequent flooding and the lack of suitable outlets.*

Sudbury Series The Sudbury Series soils consist of moderately well drained soils that have developed on sand and gravel deposits of stream terraces. These soils typically occur in small areas throughout Hartford County.

> **Sudbury Fine Sandy Loam** *(0 to 3 percent slopes) This soil is rapidly permeable, but a seasonal high water table interferes with internal drainage. Mottles at depths of 10 to 18 inches indicate that the lower subsoil is waterlogged in wet seasons. The soil is fairly easy to drain, because it is underlain by sand and gravel. A few areas having slopes of 3 to 6 percent are included with this soil.*
>
> *About 60 percent of the acreage has been cleared and is used mainly for hay and pasture. Some acreage is used for tobacco, potatoes, vegetables, silage corn, and other crops. Undrained areas are generally suited to hay, pasture silage corn, and late vegetables. Drained areas are fairly well suited to tobacco, potatoes, and other crops. Even if the soil is drained, tobacco and potatoes are subject to damage in very wet growing seasons. The soil needs fertilizer, drainage for some crops, and management that will maintain tilth and the supply of organic matter.*

Windsor Series The Windsor Series soils consist of very droughty sand and loamy soils which have typically developed on nearly level to sloping and rolling terraces. Well-defined dunes occur in areas of loamy fine sand where reworking by wind has taken place. Areas of loamy fine sand and fine sand are essentially free of gravel.

> **Windsor Series Loamy Fine Sand** *(0 to 3 percent slopes) This soil is very rapidly permeable and has a low moisture-holding capacity. It is excessively*

drained and warms very early in spring. It responds to fertilizer when the moisture supply is adequate.

About 75 percent of the acreage is forested, idle, or in urban development. Tobacco and sweet corn are the main crops, but some acreage is used for early vegetables, corn, alfalfa, pasture, and other crops. Alfalfa grows fairly well. This soil is not well suited to crops, hay, and pasture because of droughtiness. A large part of the tobacco, sweet corn, and early vegetables is irrigated. If fertilizer is applied in large quantities, good yields of crops are obtained.

Walpole Series Walpole Series soils consist of moderately coarse to medium texture, poorly drained soils which have developed from sandy or sandy and gravelly stream terrace deposits. Because these soils are poorly drained they qualify as wetland soils under the Regulations of Connecticut State Agencies (RCSA).

Walpole Series Loam *(0 to 3 percent slopes) This soil includes loam, very fine sandy loam, and silt loam textures.*

Use, suitability, and management are essentially the same as for Walpole sandy loam, 0 to 3 percent slopes. (About 50 to 60 percent of the acreage is in forest, and some is idle. A large percentage of the cleared area is used for pasture and hay. Small areas are drained or partly drained and are used for silage corn, sweet corn, tobacco, potatoes, vegetables, and other crops. Undrained areas are best suited to sod crops. Partly drained areas are suited to silage corn and late vegetables. Well-drained areas are fairly well suited to tobacco and potatoes. The soil is not suited to alfalfa and tree fruits. The major needs of this soil are drainage, fertilizer, and lime. The soil is relatively easy to drain because of the sandy, gravelly substrata.) Because of the finer texture, this soil dries out somewhat more slowly in spring. If drained, it is not quite so well suited to cultivated crops.

1.6 Soil Sampling Locations and Rationale

The general distribution of surficial materials as mapped by the SCS (1962) is shown on Drawing TM4-1. The main areas of activity in the Klondike Area were done on Made Land or areas which were once Walpole Fine Sandy Loam. In addition, Ninigret Fine Sandy Loam is also present over large areas of the Klondike. It is thought that the Ninigret Fine Sandy Loam is

compositionally similar to the Walpole Fine Sandy Loam and therefore this soil type was not considered separately.

In addition to the soils developed on the surficial stream terrace deposits, the Airport/Klondike Area is underlain by glaciolacustrine sediments. Although these glaciolacustrine sediments are not exposed at the surface, and none of the soils on the Site have developed directly from these materials, the glaciolacustrine sediments are thought to represent a significant hydrologic boundary. Therefore, samples of the glaciolacustrine sediments were analyzed to provide information regarding the distribution of natural metals in this material.

To provide a comparison between the natural soils and the Made Land present in the North Klondike, eight sampling locations from a reportedly undisturbed area north of the X-194 Test Stand and eight sampling locations from an area of Made Land east of the test stand were chosen. The samples from the undisturbed area were located in an area of Walpole Series soils. Both of the sampling areas were reported to be located sufficiently far from the test stand to have been unaffected by site operations and activities. The X-194 Test Stand is located on an area of Made Land, reportedly created from Walpole Series soils.

Sampling locations were chosen from the Made Land east of the test stand to approximate soil conditions present at the X-194 Test Stand prior to the start of operations, but after the disturbance of the soils. The sampling locations from the Walpole Series soils were selected to approximate soil conditions at the X-194 Test Stand prior to construction. Additionally, the location of the sampling points being sufficiently far from the X-194 Test Stand to have not been influenced by test stand operations.

Samples of the glaciolacustrine sediments were collected during the installation of contaminant delineation borings. Selected samples were analyzed for metals during the course of the various investigations at the Site. Samples included in this TM were selected based on the geologic descriptions provided by the field personnel, the analyses performed on the samples, and the analytical results from overlying samples in that soil boring. In general, samples were selected from areas where metals were not considered the primary contaminants. If possible, to reduce the possibility of contamination from overlying materials, samples selected for this analysis were not the uppermost clay sample logged for the boring, but were from 0.5 to 1 foot below the upper clay boundary.

The locations of the sixteen soil sampling locations, NK-SB-100 through NK-SB-115, are shown on Drawing TM4-2. The locations of the glaciolacustrine sediment sampling locations are shown on Drawing TM4-3.

2. METHODOLOGY

This section presents the methods and techniques used to collect, describe, and analyze the background soil samples collected in the North Klondike Area by Fuss & O'Neill, Inc. (F&O) (F&O, 1994). In addition, this section provides a brief description of the methods used to collect samples of the glaciolacustrine sediments by Loureiro Engineering Associates, P.C. (LEA).

2.1 General Procedures

Based upon the general location requirements, background soil sampling locations were field located by F&O personnel. The sampling locations appear to have been either randomly selected in the field or selected as representative of the desired soil type based upon the judgment of the field sampling crew. The background soil sampling locations were recorded on the field sampling data sheets, along with other pertinent information. All background soil samples of Made Land and Walpole Series soils were collected on December 17, 1993. Details of the chain-of-custody, storage and handling, and laboratory submission were unavailable.

Background soil sampling was expanded to include glaciolacustrine sediments collected during investigations conducted at various environmental units in the Airport/Klondike Area. The soil borings installed during the most recent investigation activities were installed in general accordance with the procedures described in LEA Standard Operating Procedures (SOP) *Standard Operating Procedure for Geoprobe® Probing and Sampling*, the LEA SOP *Standard Operating Procedure for Geologic Logging of Unconsolidated Sedimentary Materials* and the LEA SOP *Standard Operating Procedure for Soil Sampling.*

2.2 Soil Sampling Methods

2.2.1 Walpole Series and Made Land Soil Sampling Methods

The sixteen Walpole Series and Made Land soil samples were collected by removing the vegetative cover or organic soil layer and troweling a sufficient volume of soil for the analytical procedures directly into 4-ounce, glass sample containers with Teflon®-lined lids. At the time of sample collection, field personnel recorded sample identification information, including sample number, time and date of collection, field personnel identification, and sampling location identifier, and descriptive information for each sample, including soil type, color, apparent grain size information, moisture content, and other appropriate information. This field sampling

information was recorded on field data sheets by F&O personnel. Copies of the field data sheets are included in Attachment A.

2.2.2 Glaciolacustrine Sediment Sampling Methods

Eighteen samples of the glaciolacustrine sediments underlying the upper unconsolidated materials of the Site have been collected from soil borings and submitted for laboratory analysis. The soil borings selected were ones in which contamination was not identified. These samples were collected using the LEA Geoprobe® direct-push drilling system and Macro-Core® soil sampling system. These methods are more fully described in Technical Memorandum 5, *Soil Sampling*.

In brief, the Geoprobe® direct-push drilling system consisted of a truck-mounted, hydraulically operated percussive hammer device. The hammer was used to drive a sealed Macro-Core® soil sampler to an operator selected depth. At the selected depth, the seal was retracted by the operator, and the sampler was then driven to the final sampling depth which forced soil into the sampler. The sampler was lined with expendable polyethylene terephthalate copolyester (PETG) liners which were removed after the sampler was recovered from the borehole. After the sample liner was removed from the sampler, the contained soil was sampled for specific analytical and geologic requirements, as necessary.

2.3 Analytical Procedures

All sixteen of the surface soil samples were submitted to Ceimic Corporation for analysis of all 40 CFR 261 Appendix IX metals, including antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, tin, vanadium, zinc, and additionally for aluminum, silicon, and sodium. Laboratory reports for these surface soil samples were submitted directly to P&W and only summary analytical information was reported by F&O (F&O, 1994).

The glaciolacustrine sediment samples were analyzed by Averill Environmental Laboratory, Inc. (AEL). Samples were submitted to AEL were analyzed for arsenic, barium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and zinc. Analytical data from AEL was submitted to LEA directly in both hardcopy and electronic formats and was directly incorporated into the site database maintained by LEA.

2.4 Decontamination of Materials and Equipment

Dedicated sampling equipment was used during the sampling of the Walpole Series and Made Land soils. Field decontamination was not required for the dedicated equipment as it was precleaned and disposed of after a single use.

Samples of the glaciolacustrine sediments were not collected as part of a separate soil sampling program, but were anecdotal samples obtained during the installation of various soil borings. The purpose of consistent decontamination procedures was to prevent the potential spread of contamination between boreholes and samples, and from the immediate work area around the well borehole. All equipment and materials placed into a borehole or associated with the collection and sampling of soil from a borehole was decontaminated prior to initiating the drilling activities and between individual samples, as appropriate. Decontamination procedures are presented in the LEA SOP *Standard Operating Procedure for Hollow Stem Auger Soil Borings*.

Downhole equipment (e.g., drill rod, Macro-Core® sampling tubes, etc.) were decontaminated prior to initiating any drilling activities at the Site. Sampling equipment such as Macro-Core® sampling tubes and stainless steel spatulas were decontaminated between uses in the field at the drilling site or the decontamination pad. The decontamination pad was typically a portable plastic or metal basin of sufficient volume to hold drilling equipment which could be laid beneath the back end of the drilling rigs to contain the spent decontamination fluids.

The sampling equipment was decontaminated using the following procedure:

- Brush off gross soil particles.
- Wash and scrub equipment with phosphate-free detergent.
- Rinse equipment with deionized water.
- Rinse equipment with dilute nitric acid solution.
- Rinse equipment in deionized water.
- Rinse equipment with dilute methanol in water solution.
- Rinse equipment in deionized water.
- Allow equipment to air dry.

The decontamination water was maintained in 5-gallon buckets during use, and transferred to 55-gallon drums for disposal. LEA field personnel were responsible for preventing cross-contamination between soil samples collected for laboratory analysis. Sample preparation tables

were covered with clean, disposable plastic. Clean, disposable plastic was also laid on the ground beneath the sample preparation tables and the decontamination solutions to catch dropped soil and spilt decontamination solutions.

2.5 Sample Location Identifiers

Monitoring wells, as well as piezometers, stream gauges, soil borings, surface water and sediment sampling locations have been identified using a systematic method to prevent duplication of location identifiers, and relatively easy means of finding the referenced location on site maps. All areas of the Pratt & Whitney East Hartford facility (including the Andrew Willgoos Turbine Laboratory, the Colt Street wastewater treatment facility, and other areas of the facility not included in this TM) have been assigned two-letter identifiers based upon the common name for the area. These two-letter designations are presented in Table 1.

In addition, each type of sampling location has been assigned a two-letter designation to distinguish the various type of sampling, locations possible. The two-letter designations for the various sampling locations are also presented in Table 1. Because of the large number of soil and water monitoring locations existing on site, and the large areas involved, the Airport and Klondike areas have each been broken down into northern and southern sections. All monitoring and sampling locations have been given a location identifier based on their location in the Airport or Klondike Areas, the type of sampling or monitoring location, and finally a sequential numeric identifier based upon the specific type of location.

2.6 Waste Management

All spent decontamination fluids generated during drilling activities and purge water generated during monitoring well development activities for the site characterization was placed in 55-gallon closed-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the wells contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

All soil cuttings generated during drilling activities were placed in 55-gallon open-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the locations contributing to each was listed, and the information tracked to aid in waste characterization and disposal.

2.7 Health and Safety

Sampling was performed by F&O personnel under their corporate, site-specific health and safety plan. Loureiro Engineering Associates field crews conducted field operations in accordance with the LEA Site Health and Safety Plan. In general, soil sampling was conducted in modified Level D personal protective equipment (PPE) consisting of safety glasses, surgical or nitrile gloves, and hard hats and steel-toed shoes for the drill rig operators.

3. RESULTS AND CONCLUSIONS

3.1 Soil Types

At the time the background soil samples were collected by F&O personnel, a description of the collected soil was recorded on the field data sheets. The sixteen soil samples collected appear to fall into groups, based primarily upon the soil color and descriptions provided on the field sampling records. The eight samples collected from north of the X-194 Test Stand, NK-SB-100 through NK-SB-107, and one sample collected from east of the test stand area, NK-SB-108, were described as very dark brown (reported as a dusky yellowish brown, but noted as having a Munsell® color designation 10YR 2/2), medium to fine grained sand. Four of the samples collected from east of the test stand area, NK-SB-109 through NK-SB-112, were described as black (reported as brownish black, but noted as having a Munsell® color designation 5YR 2/1), fine to medium sand. Three of the samples collected from east of the test stand area, NK-SB-113 through NK-SB-115, were described as reddish brown (reported as a medium yellowish brown, but noted as having a Munsell® color designation 10YR 5/4), coarse to fine grained sand.

Descriptions of the sampling locations from the area north of the test stand area, NK-SB-100 through NK-SB-107, indicate that the soils in the general area may have been influenced to some degree by human activities. Identified in the descriptions are an access road, a chain-link fence, a "depression," a pile of wood chips, and the diverted unnamed stream. The presence of these entities indicates some degree of prior human activity in the area, however, they do not indicate that the soils were definitely altered. Two of the samples, NK-SB-103 and NK-SB-105, were reported to have foreign material described as "wood chips" present. All but two of the samples, NK-SB-106 and NK-SB-107, were identified as "wetland" soils on the field sampling records.

Descriptions of the sampling locations from east of the test stand area, NK-SB-108 through NK-SB-115, indicate that samples from NK-SB-109 through NK-SB-111 were collected from the top of two "ridges" in the area, sample NK-SB-112 was collected from a lowland area between the two ridges, and samples from NK-SB-108, NK-SB-113 through NK-SB-115 were collected in various other locations in the general vicinity. The soil sample collected from NK-SB-113 was identified as a "wetland" soil on the field sampling record.

SCS mapping of the soils appear have some inconsistencies. For instance, areas of the North Airport where the paved landing field exists are mapped as natural soils and should have been mapped as Made Land. Additionally, areas of the Klondike where historical operations and construction activities have occurred are also mapped as natural soils and should have been

mapped as Made Land. These apparent inconsistencies are due to the timing of the field mapping, the construction activities in the Airport/Klondike Area, and the aerial photography that was done for publication. The northeast corner of the Airport runway was extended, and construction activities in the Klondike were commenced after the field mapping activities, but before the aerial photography was performed.

For the initial analysis of these samples, F&O divided the samples into Walpole soils and Made Land, based upon the SCS mapping. However, based upon the field descriptions of the soils recorded at the time of sampling, F&O identified two soil samples, originally collected as Walpole Series soils north of the test stand area, as being more consistent with Made Land soils and grouped these results with the Made Land data. The report did not explicitly identify the two samples, however it appears that the samples were NK-SB-106 and NK-SB-107, because these samples were NOT identified as "wetland" soils on the field sampling records, and it appears that the data from these samples were incorporated into the Made Land data during the statistical analyses. Consequently, F&O identified six Walpole soil data and ten Made Land soil data.

In general, these divisions appear to be adequate based upon the descriptions of the Walpole Series provided by the SCS, and the soil descriptions provided by the field sampling crews. The soil descriptions provided by the field sampling crews are not detailed soil descriptions, but are Burmister soil descriptions. No indication of visually identifiable disturbances to the soil structure, the presence or absence of soil structure, or other standard soil descriptions are provided.

3.2 Analytical Results

3.2.1 Walpole Series and Made Land Soils Analytical Results

Walpole Series and Made Land soil samples were submitted for analysis for the metals listed in 40 CFR 261 Appendix IX, including antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, tin, vanadium, and zinc, and additionally for aluminum, silicon, and sodium. Summary analytical results for the Walpole Series and Made Land soil samples are presented in Table 2. No antimony, silver, thallium, or tin was detected in any of the Walpole Series or Made Land soil samples collected.

3.2.2 Glaciolacustrine Sediment Analytical Results

Glaciolacustrine sediment samples were submitted for analysis of arsenic, barium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and zinc. Arsenic, barium, cadmium,

chromium, nickel, and zinc were detected in the majority of the samples submitted for analysis. Lead was detected in only one sample, and mercury was detected in two samples. Summary analytical results for the glaciolacustrine sediment samples submitted for analysis are presented in Table 3. No selenium or silver was detected in any of the glaciolacustrine sediment samples submitted for analysis.

3.3 Statistical Analysis of Walpole Series and Made Land Soils Metals Concentrations

A statistical analysis of the metals data was performed to determine the average concentration of each of the metals detected in the soil samples and to estimate a maximum concentration of each analyzed metal likely to occur naturally in the onsite soils. The data from each soil type were analyzed separately. Data were analyzed to determine whether they followed a normal distribution, and for the presence of outliers. After a final data set and statistical distribution were decided upon, the data were analyzed to determine the various parameters of the data set necessary to describe the maximum expected concentrations of the detected metals in unaltered soil samples. It should be noted that, although it was not explicitly stated, non-detects were replaced by one half the detection limit in the statistical analyses and distribution testing (F&O, 1994).

The statistical test for normality of the data was the Kolmogorov-Smirnoff Test. Based upon the results of these tests, data sets may have been log-transformed and the distribution of the transformed data retested to determine its distribution. If the data were not adequately represented by either a normal or a log-normal distribution, non-parametric statistics were used to describe the data.

The data sets were inspected to determine if outliers appeared to exist, and suspected outliers were tested using the method described in "*Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*" (EPA 1989). Data points were rejected if there was less than a five percent chance of that value having come from the population as sampled. Entire soil samples were not rejected if selected metals analyses data from that boring were rejected as outliers. That is, outliers were treated as if they were the result of random sampling or analytical errors independent of other sampling or analytical parameters. Although no evidence was presented to indicate a justification for treating these extreme values as true outliers, removal of these data from the set of values results in a more conservative estimate of the population mean and the estimated maximum likely concentration of each metal.

After a suitable distribution was determined, descriptive statistics were calculated to characterize the metals concentrations and determine the maximum expected metals concentrations for the Walpole Series and Made Land soils. The maximum expected concentration was operationally defined as the 95th percentile estimate for the population. The 95th percentile of the population is the concentration below which 95 percent of the population fall. The upper 95th percentile of a normally or log-normally distributed population was estimated from sample data using the following equation:

$$\overline{X}_{95} = \overline{x} + t_{0.05} \cdot s$$

where: $\overline{X}_{95}$ is the 95th percentile of the population ,

$\overline{x}$ is the sample mean,

$t_{0.05}$ is the Student's *t*-statistic value for a significance level of five percent, and

s is the standard deviation of the sample.

Except for beryllium, cadmium and silver, of the six samples identified as Walpole soils, four to six of the samples contained detectable concentrations of the metals analyzed. For beryllium, cadmium, and silver, a value equal to one-half the detection was used in place of the non-detects. The use of one-half the detection limit in place of the non-detect does not bias the estimate of the mean, but can bias the estimate of the standard deviation of a population (Gilbert, 1989). It is believed that, due to the relative values of the detection limit and the detected concentrations, the relative error associated with this method is acceptable for the uses of the data and is likely to be on the order of the associated measurement errors.

3.4 Statistical Analysis of Glaciolacustrine Sediments Metals Concentrations

The metals concentrations in the glaciolacustrine sediments were calculated in the same manner as the metals concentrations in the Walpole Series and Made Land soils. Only one glaciolacustrine sediment sample contained a detectable concentration of lead, and none contained detectable concentrations of selenium or silver. Two samples contained detectable concentrations of mercury. The remaining metal analytes, arsenic, barium, cadmium, chromium, nickel, and zinc, were detected in between twelve and seventeen of the samples.

The glaciolacustrine sediment metals data were analyzed to determine whether the data could be considered normally distributed. Following the methodology used for the analysis of metals concentrations in the background soils, non-detects were replaced by one-half the detection limit. The use of one-half the detection limit in place of the non-detect does not bias the estimate of the

mean, but can bias the estimate of the standard deviation of a population (Gilbert, 1989). It is believed that, due to the relative values of the detection limit and the detected concentrations, the relative error associated with this method is acceptable for the uses of the data and is likely to be on the order of the associated measurement errors.

In general, the data were not normally distributed. Logarithmic and exponential transformations were unsuccessful in producing a normally distributed data set. No samples were rejected as outliers based upon a lack of evidence for erroneous or improper data or samples.

Because of the general lack of normality, and in the interest of maintaining a consistent set of comparison, non-parametric analyses were used to calculate the maximum expected concentrations for each of the metals in the glaciolacustrine sediments. The maximum expected concentration was operationally defined as the 95th percentile estimate for the population. The 95th percentile of the population is the concentration below which 95 percent of the population fall. The upper 95th percentile of a non-parametric distribution was calculated by regressing the sample rank against concentration to determine the rank of the 95th percentile.

3.5 Average Walpole Series and Made Land Soil Metals Concentrations

The maximum expected concentrations of metals, as determined from the analyses of Walpole Fine Sandy Loam soil samples collected from the area north of the X-194 Test Stand area are presented in Table 4. Also included in Table 5 are similar concentration values from the Made Land soil samples.

It was noted in the original F&O report that, except for aluminum, the metals concentrations are higher in the Walpole soil samples than in the Made Land soils. F&O attributed this to the presumably generally higher humic and organic content, and higher water content of the Walpole soils, based on the fact that these soils are poorly drained, wetland type soils. The organic and humic content of these soils would complex with metals and bind them to the organic materials.

The background reference concentrations statistically calculated from the soils analyses were also compared to published reference concentrations of metals from *Elemental Concentrations in Soils and Surficial Materials of the Conterminous United States*, (Shacklette and Boerngen, 1984) to determine if the values were "reasonable." Data from Shacklette and Boerngen (1984) is presented in Table 7.

In general, the reference concentrations determined statistically from the background soil sampling are within the limits of observed soil metals concentrations reported in Shacklette and

Boerngen (1984), and most are also sufficiently close to the average observed concentrations to be considered "reasonable." The only exception is the reference concentration of cadmium for the Walpole soils, which was calculated as 0.88 mg/kg and Shacklette and Boerngen (1984) report an observed maximum of 0.7 mg/kg. However, the reference concentration of 0.88 mg/kg was calculated based on two detects and four non-detects and the small deviation from a reported average concentration is not considered significant.

3.6 Average Glaciolacustrine Sediments Metals Concentrations

The maximum expected concentrations of metals in the glaciolacustrine sediments, as determined from the analyses of glaciolacustrine sediment samples from various areas of the Site, are presented in Table 6.

The metals concentration data were not compared to observed soil metals concentrations reported by Shacklette and Boerngen (1984), because these data do not represent the same type of materials as the glaciolacustrine sediments. In general, however, the reference concentrations determined statistically from the glaciolacustrine sediment analyses are similar to the data presented by Shacklette and Boerngen (1984). The glaciolacustrine sediments appear to have significantly higher concentrations of cadmium, mercury, and nickel then the materials analyzed by Shacklette and Boerngen (1984).

Metals concentrations in the glaciolacustrine sediments is a result of the initial metals content of the sediments, and subsequent metals adsorption on clay minerals during diagenesis. The metals adsorbed onto the clay mineral surfaces would be a function of the available metals, the type of clay minerals present, and the geochemistry of local groundwaters.

3.7 Conclusions

Sitewide background soil metals concentrations in Walpole Series soils and Made Land soils in the North Klondike were estimated based on soil samples collected from specific soil series in the area. Generally, the number of data points appears adequate for the Walpole Soils and Made Land areas. Although the number of data points is somewhat restricted, it is likely that additional sampling would be difficult and that the reference concentrations would not change significantly. In fact, it is possible, based on the previous decision to discard apparent outliers, that the reference concentrations would increase.

The calculated reference concentrations appear to be conservatively estimated and adequately distributed in the areas reported to represent undisturbed areas of the Site. The statistical analysis

of the data appears to be adequate, and the elimination of the extreme values from selected populations represents a conservative estimate of the population parameters. The calculated reference concentrations of metals in soils compare favorably to published values for occurring metals in natural soils in the United States.

Metals concentrations in the glaciolacustrine sediments underlying the upper unconsolidated sediments were estimated based on eighteen selected analyses. These data were analyzed statistically in a manner similar to that used for the Walpole Series and Made Land soils. In general, metals analyses for the glaciolacustrine sediments are similar to, but not directly comparable to, the metals data for the on-site background soils and "typical" surficial materials.

REFERENCES

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United States Department of Agriculture, Soil Conservation Service, 1962, *Soil Survey, Hartford County, Connecticut.*

United States Environmental Protection Agency, 1989, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, Office of Solid Waste, Washington, DC.

TABLES

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Table 1
Area and Sampling Type Identifiers
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Area Designation	Area	Sampling Type Identifier	Explanation
AB	Within A Building	MW	Monitoring Well
BB	Within B Building	PZ	Piezometer
CB	Within C Building	SW	Surface Water
DB	Within D Building	SD	Sediment
EB	Within E Building	CC	Concrete Chip
FB	Within F Building	SS	Surface Soil
GB	Within G Building	SB	Soil Boring
HB	Within H Building		
JB	Within J Building		
KB	Within K Building		
LB	Within L Building		
MB	Within M Building		
CS	Colt Street Facility		
EA	Engineering Area		
ET	Experimental Test Airport Laboratory		
LM	Area Outside Buildings L and M		
NA	North Airport Area		
NT	North Test Area		
NW	North Willgoos Area		
PH	Powerhouse Area		
SA	South Airport Area		
SK	South Klondike Area		
ST	South Test Area		
SW	South Willgoos Area		
WT	Waste Treatment Area		
XT	Experimental Test Area		

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Metals Concentrations in Walpole Series and Made Land Soils
Airport/Klondike Area, Pratt & Whitney, East hartford, Connecticut

Boring Number	Description	Soil Type		Percent Solids	Constituent				
		Mapped	Determined		Aluminum	Antimony	Arsenic	Barium	Beryllium
NK-SB-100	Dusky brown (5YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	71.4	2900	7.1 U N	1.1 B	8.3 B	0.09 U
NK-SB-101	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	56.9	4400	8.3 U N	4.4	22.5 B	0.11 U
NK-SB-102	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	42.3	3290	12.2 U N	3.9 B	49.8 B	0.16 U
NK-SB-103	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	46.3	4260	7.9 U N	4.7	55.1 B	0.34 B
NK-SB-104	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	68.0	2670	6.6 U N	2.9	8.2 B	0.11 B
NK-SB-105	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	50.2	3620	8.9 U N	5.3	33.5 B	0.13 U
NK-SB-106	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	52.5	3960	8 U N	3.8	28.2 B	0.12 U
NK-SB-107	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	63.6	5210	7.5 U N	1.5 B	46.8 B	0.30 B
NK-SB-108	Dusky yell. brown (10YR 2/2) fine to med. sand	Made Land	Made Land	82.4	4930	4.5 U N	1.8	8.2 B	0.13 B
NK-SB-109	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	84.9	7980	5.6 U N	1.7 B	14.1 B	0.21 B
NK-SB-110	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	78.1	8110	6.8 U N	20 B	11.1 B	0.21 B
NK-SB-111	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	75.7	8620	6.7 U N	2.5	10.4 B	0.21 B
NK-SB-112	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	76.7	4000	5 U N	0.95 B	8.1 B	0.1 B
NK-SB-113	Dusky yell. brown (10YR 2/2) fine to coarse sand	Made Land	Made Land	77.3	4860	6.8 U N	1.9 B	6.8 B	0.12 B
NK-SB-114	Med. yell. brown (10YR 5/4) fine to coarse sand	Made Land	Made Land	76.8	3730	5.2 U N	1.7 B	16.4 B	0.11 B
NK-SB-115	Med. yell. brown (10YR 5/4) fine to coarse sand	Made Land	Made Land	71.8	3220	6 U N	1.2 B	8.8 B	0.16 B

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Metals Concentrations in Walpole Series and Made Land Soils
Airport/Klondike Area, Pratt & Whitney, East hartford, Connecticut

Boring Number	Description	Soil Type		Constituent					
		Mapped	Determined	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury
NK-SB-100	Dusky brown (5YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	0.37 U	2.1 U	0.96 B	3.2 B	13.0	0.06 U
NK-SB-101	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	0.45 U	8.7	1.5 B	15.6	114	0.18
NK-SB-102	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	0.86	11.2	3.5 B	25.7	294	0.51
NK-SB-103	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	0.78	9.2	2.2 B	29.2	190	0.29
NK-SB-104	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	0.39 U	2.7	0.73 U	7.1	29.1	0.06 U
NK-SB-105	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	0.51 U	5.7	1.2 B	13.7	109	0.24
NK-SB-106	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	0.50 U	3.4	0.92 B	16.9	67.7	0.11 B
NK-SB-107	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	0.41 U	2.5 B	1.0 B	1.7 U	12.8	0.08 U
NK-SB-108	Dusky yell. brown (10YR 2/2) fine to med. sand	Made Land	Made Land	0.32 U	6.2	3.1 B	6.4	12.0	0.05 U
NK-SB-109	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	0.31 U	6.8	2.5 B	4.6 B	15.2	0.16
NK-SB-110	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	0.34 U	7.1	2.2 B	6.0 B	17.4	0.05 U
NK-SB-111	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	0.32 U	7.4	2.0 B	5.1 B	15.4	0.06 U
NK-SB-112	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	0.34 U	5.3	2.2 B	5.3	7.4	0.06 B
NK-SB-113	Dusky yell. brown (10YR 2/2) fine to coarse sand	Made Land	Made Land	0.33 U	4.2	1.8 B	4.0 B	13.8	0.06 U
NK-SB-114	Med. yell. brown (10YR 5/4) fine to coarse sand	Made Land	Made Land	0.32 U	6.1	8.1 B	5.3	3.8	0.06 U
NK-SB-115	Med. yell. brown (10YR 5/4) fine to coarse sand	Made Land	Made Land	0.34 U	5.5	2.9 B	5.2	3.5	0.15

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Metals Concentrations in Walpole Series and Made Land Soils
Airport/Klondike Area, Pratt & Whitney, East hartford, Connecticut

Boring Number	Description	Soil Type		Constituent					
		Mapped	Determined	Nickel	Selenium	Silver	Sodium	Thallium	Vanadium
NK-SB-100	Dusky brown (5YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	4.5 U	0.53 U	0.26 U N	50.5 B	1.1 U	7.4 B
NK-SB-101	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	7.8 B	0.62 U	0.31 U N	56.9 B	1.2 U	26.1
NK-SB-102	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	18.3	1.3 B	1.4 B N	92.2 B	1.8 U	33.6
NK-SB-103	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	12.4	1.3 B	0.71 B N	53.1 B	1.2 U	23.5
NK-SB-104	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	4.1 U	0.86 B	0.24 U N	49.9 B	0.97 U	11.6 B
NK-SB-105	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	5.6 U	1.0 B	0.33 U N	59.3 B	1.3 U	27.7
NK-SB-106	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	5.1 U	1.6 B	0.30 U N	65.0 B	1.2 U	20.1
NK-SB-107	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	4.7 U	0.60 U	0.28 U N	62.3 B	1.1 U	6.4 B
NK-SB-108	Dusky yell. brown (10YR 2/2) fine to med. sand	Made Land	Made Land	15.2	0.56 U	0.17 U N	37.4 B	0.6 U	18.1
NK-SB-109	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	4.3 B	0.33 U	0.21 U N	40.1 B	0.83 U	17.6
NK-SB-110	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	4.3 U	0.48 B	0.25 U N	48.6 B	1.0 U	19.4
NK-SB-111	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	4.2 U	0.37 U	0.25 U N	36.7 B	1.0 U	18.6
NK-SB-112	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	4.8 B	0.71 B	0.18 U N	43.7 B	0.73 U	12
NK-SB-113	Dusky yell. brown (10YR 2/2) fine to coarse sand	Made Land	Made Land	4.6 B	0.50 B	0.25 U N	44.0 B	1.0 U	15.5
NK-SB-114	Med. yell. brown (10YR 5/4) fine to coarse sand	Made Land	Made Land	8.2	0.39 U	0.19 U N	44.7 B	0.78 U	10.9
NK-SB-115	Med. yell. brown (10YR 5/4) fine to coarse sand	Made Land	Made Land	6.4 B	0.37 U	0.31 B N	36.3 B	0.74 U	8.7

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Metals Concentrations in Walpole Series and Made Land Soils
Airport/Klondike Area, Pratt & Whitney, East hartford, Connecticut

Boring Number	Description	Soil Type		Constituent		
		Mapped	Determined	Zinc	Tin	Silicon
NK-SB-100	Dusky brown (5YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	4.8 B	15.6 U	712 N
NK-SB-101	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	26.5	18.2 U	721 N
NK-SB-102	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	53.3	26.6 U	1240 N
NK-SB-103	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	43.6	17.3 U	520 N
NK-SB-104	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	6.0	14.3 U	882 N
NK-SB-105	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	23.7	19.4 U	878 N
NK-SB-106	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	13.6	17.6 U	532 N
NK-SB-107	Dusky yell. brown (10YR 2/2) fine to med. sand	Walpole Fine Sandy Loam	Made Land	8.6	16.4 U	869 N
NK-SB-108	Dusky yell. brown (10YR 2/2) fine to med. sand	Made Land	Made Land	9.6	9.7 U	369 N
NK-SB-109	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	10.6	12.3 U	666 N
NK-SB-110	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	11.2	14.8 U	993 N
NK-SB-111	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	9.4	14.7 U	934 N
NK-SB-112	Brownish black (5YR 2/1) fine to med. sand	Made Land	Walpole Fine Sandy Loam	10.5	10.8 U	625 N
NK-SB-113	Dusky yell. brown (10YR 2/2) fine to coarse sand	Made Land	Made Land	9.3	14.6 U	659 N
NK-SB-114	Med. yell. brown (10YR 5/4) fine to coarse sand	Made Land	Made Land	13.8	11.5 U	283 N
NK-SB-115	Med. yell. brown (10YR 5/4) fine to coarse sand	Made Land	Made Land	14.3	11.0 U	342 N

Table 3
Metals Concentrations in Glaciolacustrine Sediments
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information			Constituent				
Soil Boring ID	Sub-Area	Environmental Unit	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)
NA-SB-02	North Airport	Army Barracks	3.53	153	4.43	29.5	<28.6
NA-SB-13	North Airport	Pickle Company	4.09	138	<4.56	34.4	<30.4
NA-SB-16	North Airport	Pickle Company	5.9	188	5.69	37.1	<30
NK-SB-08	North Klondike	Ex. Storage Area	4.98	312	8.13	55.8	<30.1
NK-SB-09	North Klondike	Ex. Storage Area	1.87	34.3	<3.8	<6.33	<25.3
NK-SB-10	North Klondike	Ex. Storage Area	<1.24	48.4	<3.71	<6.19	<24.8
NK-SB-13	North Klondike	Ex. Storage Area	6.9	254	<4.82	48.2	<32.1
NK-SB-17	North Klondike	Ex. Storage Area	5.33	286	<4.57	48.2	<30.5
NK-SB-24	North Klondike	X-430	6.38	322	8.31	45.1	<30.8
NK-SB-26	North Klondike	X-415	9.6	338	7.74	54.8	<29.2
NK-SB-27	North Klondike	X-415	9.09	265	6.3	50.3	<30.7
NK-SB-27	North Klondike	X-415	9.84	295	7.98	54.3	<33.2
NK-SB-28	North Klondike	X-415	8.85	263	6.64	47.8	<33.2
NK-SB-29	North Klondike	X-415	7.62	286	6.21	51.1	<28.2
NK-SB-59	North Klondike	X-194	8.95	265	7.11	43.6	<31.6
NK-SB-232	North Klondike	X-407	7.94	259	6.25	50.1	<27.8
NK-SB-236	North Klondike	X-407	7.16	292	6.59	55.2	<30.6
NK-SB-333	North Klondike	X-407	<1.2	21.5	<0.12	6	2.2

Table 3
Metals Concentrations in Glaciolacustrine Sediments
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information			Constituent				
Soil Boring ID	Sub-Area	Environmental Unit	Mercury (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Zinc (mg/kg)
NA-SB-02	North Airport	Army Barracks	<0.286	26.2	<1.43	<7.15	87.5
NA-SB-13	North Airport	Pickle Company	<.304	21.8	<1.52	<7.61	84.4
NA-SB-16	North Airport	Pickle Company	<0.3	32.1	<1.5	<7.49	91.5
NK-SB-08	North Klondike	Ex. Storage Area	<.301	52.7	<1.51	<7.53	130
NK-SB-09	North Klondike	Ex. Storage Area	<0.253	<12.7	<1.27	<6.33	13.7
NK-SB-10	North Klondike	Ex. Storage Area	<0.248	<12.4	<1.24	<6.19	14.1
NK-SB-13	North Klondike	Ex. Storage Area	<0.321	43.4	<1.61	<8.04	106
NK-SB-17	North Klondike	Ex. Storage Area	<0.305	43.1	<1.52	<7.62	107
NK-SB-24	North Klondike	X-430	<0.308	39.5	<1.54	<7.69	109
NK-SB-26	North Klondike	X-415	<0.292	52.4	<1.46	<7.3	129
NK-SB-27	North Klondike	X-415	<0.307	44.3	<1.54	<7.69	119
NK-SB-27	North Klondike	X-415	<0.332	44.2	<1.66	<8.31	131
NK-SB-28	North Klondike	X-415	<0.332	44.3	<1.66	<8.3	115
NK-SB-29	North Klondike	X-415	<0.282	46.3	<1.41	<7.06	116
NK-SB-59	North Klondike	X-194	<0.316	39	<1.58	<7.9	113
NK-SB-232	North Klondike	X-407	0.178	47.3	<1.39	<6.94	121
NK-SB-236	North Klondike	X-407	0.169	46.4	<1.53	<7.66	131
NK-SB-333	North Klondike	X-407	<0.18	8.5	<0.98	<3.7	<18.3

Table 4

Statistical Analysis of Walpole Series Soils Metals Concentrations
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Statistic	*Aluminum*	*Arsenic*	*Barium*	*Beryllium*	*Cadmium*	*Chromium*	*Cobalt*	*Copper*	*Lead*	*Mercury*	*Nickel*
Mean	5788.57	4.28	10.81	0.16		6.06	2.27	5.07	10.93	0.07	4.29
Standard Error	887.81	2.63	1.29	0.02		0.43	0.16	0.24	2.22	0.02	0.89
Median	4860	1.7	10.4	0.16		6.1	2.2	5.2	13.8	0.03	4.3
Mode				0.21			2.2				
Standard Deviation	2348.93	6.95	3.41	0.05		1.14	0.39	0.63	5.87	0.06	2.35
Sample Variance		48.31	11.63	0.00		1.30	0.15	0.39	34.47	0.00	5.53
Kurtosis	-2.51	6.89	-0.50	-2.45		-0.66	0.42	1.01	-2.13		
Skewness	0.24	2.62	0.69	-0.05		-0.48	0.75	-0.48	-0.41		
Range	5400	19.05	9.6	0.11		3.2	1.1	2	13.9	0.135	6.1
Minimum	3220	0.95	6.8	0.1		4.2	1.8	4	3.5	0.025	2.1
Maximum	8620	20	16.4	0.21		7.4	2.9	6	17.4	0.16	8.2
Sum	40520	29.95	75.7	1.12		42.4	13.6	35.5	76.5	0.455	30.05
Count	7	7	7	7		7	6	7	7	7	7
Confidence Level (95.0%)	1740.08	5.15	2.53	0.04		0.84	0.31	0.46	4.35	0.05	1.74

Table 4

Statistical Analysis of Walpole Series Soils Metals Concentrations
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Statistic	*Selenium*	*Silver*	*Sodium*	*Vanadium*	*Zinc*	*Silicon*
Mean	0.29		42.01	14.67	11.30	643.14
Standard Error	0.06		1.70	1.57	0.76	101.01
Median	0.19		43.7	15.5	10.6	659
Mode						
Standard Deviation	0.16		4.51	4.16	2.00	267.24
Sample Variance	0.03		20.32	17.35	4.00	71415.14
Kurtosis			-1.07	-1.78	-1.03	-1.08
Skewness			-0.07	-0.30	0.78	-0.08
Range	0.335		12.3	10.7	5	710
Minimum	0.165		36.3	8.7	9.3	283
Maximum	0.5		48.6	19.4	14.3	993
Sum	1.71		294.1	102.7	79.1	4502
Count	6		7	7	7	7
Confidence Level (95.0%)	0.13		3.34	3.09	1.48	197.97

Table 5

Statistical Analysis of Made Land Soils Metals Concentrations
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Statistic	*Aluminum*	*Arsenic*	*Barium*	*Beryllium*	*Cadmium*	*Chromium*	*Cobalt*	*Copper*	*Lead*	*Mercury*	*Nickel*
Mean	5462.00	3.71	12.46	0.16	0.18	5.45	2.07	5.89	16.90	0.06	3.88
Standard Error	636.43	1.83	2.22	0.02	0.01	0.51	0.25	1.34	5.85	0.02	0.73
Median	4895	1.75	10.4	0.145	0.1675	5.8	2.2	5.25	13.3	0.03	2.55
Mode		1.7		0.21	0.16		2.2	5.3		0.03	
Standard Deviation	2012.57	5.78	6.66	0.07	0.03	1.63	0.75	4.25	18.49	0.05	2.19
Sample Variance		33.40	44.33	0.01	0.00	2.65	0.56	18.02	341.99	0.00	4.81
Kurtosis	-1.24	9.49	4.10	0.06	4.57	-0.55	-0.62	6.31	8.22	-0.45	0.31
Skewness	0.73	3.06	1.94	0.60	2.17	-0.68	-0.38	2.05	2.75	1.19	1.16
Range	5400	19.05	21.4	0.24	0.095	4.9	2.18	16.815	64.2	0.135	6.1
Minimum	3220	0.95	6.8	0.06	0.155	2.5	0.92	0.085	3.5	0.025	2.1
Maximum	8620	20	28.2	0.3	0.25	7.4	3.1	16.9	67.7	0.16	8.2
Sum	54620	37.05	112.1	1.61	1.765	54.5	18.62	58.885	169	0.63	34.95
Count	10	10	9	10	10	10	9	10	10	10	9
Confidence Level (95.0%)	1247.3793	3.5822113	4.3498714	0.0441608	0.0181906	1.0084228	0.490735	2.6313722	11.461779	0.0339224	1.4327503
95% Percentile Level	9151.27	14.30	24.84	0.29	0.23	8.43	3.47	13.67	50.80	0.16	7.96

Table 5

Statistical Analysis of Made Land Soils Metals Concentrations
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Statistic	*Selenium*	*Silver*	*Sodium*	*Vanadium*	*Zinc*	*Silicon*
Mean	0.43	0.12	44.06	14.73	11.09	627.20
Standard Error	0.15	0.01	2.97	1.54	0.66	79.20
Median	0.28	0.125	43.7	16.55	10.55	642
Mode	0.185	0.125				
Standard Deviation	0.46	0.02	8.90	4.87	2.08	250.44
Sample Variance	0.21	0.00	79.26	23.74	4.34	62718.62
Kurtosis	7.08	-1.34	4.03	-1.19	-1.30	-1.27
Skewness	2.59	0.04	1.84	-0.60	0.60	0.09
Range	1.435	0.065	28.7	13.7	5.7	710
Minimum	0.165	0.085	36.3	6.4	8.6	283
Maximum	1.6	0.15	65	20.1	14.3	993
Sum	3.89	1.04	396.5	147.3	110.9	6272
Count	9	9	9	10	10	10
Confidence Level (95.0%)	0.2977052	0.0149199	5.8163046	3.0200153	1.2906839	155.21929
95% Percentile Level	1.28	0.16	60.61	23.66	14.91	1086.28

Table 6
Statistical Analysis of Glaciolacustrine Sediments Metals Concentrations
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Statistic	*Arsenic*	*Barium*	*Cadmium*	*Chromium*	*Lead*	*Mercury*	*Nickel*	*Zinc*
Mean	6.07	223.34	5.12	39.88	14.21	0.15	35.78	95.96
Standard Error	0.70	24.00	0.62	4.24	0.76	0.00	3.64	9.66
Median	6.64	264.00	6.23	48.00	15.13	0.15	43.25	111.00
Mode		286.00		48.20	16.60	0.17	44.30	131.00
Standard Deviation	2.96	101.82	2.63	17.98	3.21	0.02	15.45	40.97
Sample Variance	8.77	10368.12	6.91	323.20	10.29	0.00	238.63	1678.82
Kurtosis	-0.63	-0.20	-1.17	0.59	12.95	3.55	-0.17	0.97
Skewness	-0.62	-1.05	-0.52	-1.37	-3.40	-1.54	-1.06	-1.49
Range	9.24	316.50	8.25	52.71	14.40	0.09	46.50	121.85
Minimum	0.60	21.50	0.06	3.10	2.20	0.09	6.20	9.15
Maximum	9.84	338.00	8.31	55.80	16.60	0.18	52.70	131.00
Sum	109.25	4020.20	92.17	717.76	255.75	2.68	644.05	1727.35
Count	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
Confidence Level (95.0%)	1.37	47.04	1.21	8.31	1.48	0.01	7.14	18.93
95% Percentile Level	10.70	373.05	9.17	65.19	17.71	0.18	58.40	152.44

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Table 7
Elemental Concentrations in Soils and Surficial Materials of the Conterminous United States
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Constituent	CAS Number	Concentrations Detected in Soil (mg/kg)	
		Average	Observed Range
Aluminum (fume or dust)	7429-90-5	66,000	700 → 100,000
Antimony	7440-36-0	0.67	<1 → 8.8
Arsenic	7440-38-2	7.2	<0.1 → 97
Barium	7440-39-3	580	10 → 5,000
Beryllium	7440-41-7	0.92	<1 → 15
Boron (water soluble)	7440-42-8	34	<20 → 3000
Cadmium	7440-43-9	0.06	0.01 → 0.7
Calcium	7440-70-2	24,000	<150 → 320,000
Cerium	7440-45-1	86	<150 → 300
Chromium	7440-47-3	54	1.0 → 2,000
Cobalt	7440-48-4	10	<3 → 70
Copper	7440-50-8	25	<1 → 700
Gallium	7440-55-3	19	<5 → 70
Iron	7439-89-6	25,000	100 → 100,000
Lanthanum	7439-91-0	41	30 → 200
Lead	7439-92-1	19	<10 → 700
Manganese	7439-96-5	560	<1 → 7,000
Mercury	7439-97-6	0.089	<0.01 → 4.6
Molybdenum	7439-98-7	----	<3 → 7.0
Nickel	7440-02-0	19	<5 → 700
Phosphorus (white or yellow)	7723-14-0	420	20 → 6,000
Potassium	7440-09-7	23000	50 → 70,000
Selenium	7782-49-2	0.39	<0.1 → 4.3
Sodium	7440-23-5	12000	<500 → 100,000
Strontium	7440-24-6	240	<5 → 3,000
Vanadium (fume or dust)	7440-62-2	76	<7 → 500
Zinc (fume or dust)	7440-66-6	60	<5 → 2,900

Reference: Shacklette, H.T., and J.G. Boerngen, 1984, "Elemental Concentrations in Soils and Surficial Materials of the Conterminous U.S.," USGS Professional Paper 1270, U.S. government Printing Office, Washington, DC.

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ATTACHMENT A

Field Data Sheets

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

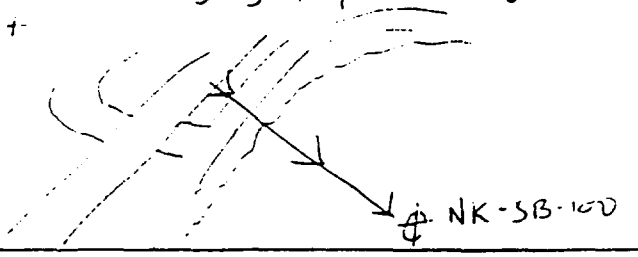
Client/Project Name: PRATT & WHITNEY EAST HARTFORD | Project #: 93-2249

Project Location: EAST HARTFORD CT | Sampling Location: NK-SB-100

Sample #: 10001145

Sample Location Info

At the culvert crossing airport road - cross stream and head due South east.



Sample Data

Container	Quantity	Preservative
4oz Glass	1 ✓	NSJS

Date: 12-17-93 Time: 1026

Sampler: JMT / SMS Weather: 40° SUNNY

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) Tongue depressor

Field decon: Yes / ~~No~~ SMS / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: ——— Instrument: ———

Sample Depth: Below organics Core Length: ———

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, (Wetland), B Horizon, Outwash, Etc.)

Munsell Color: DUSKY BROWN 5YR 2/2 Grain Size: FINE TO MED. SAND

Sample Description Foreign Material: N/A

Appearance: DUSKY BROWN FINE TO MED SAND

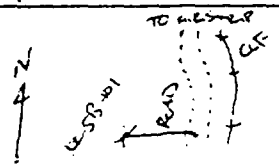
Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY	Project #: 93-2214.9
Project Location: EAST HARTFORD, CT	Sampling Location: NK-SB-101
Sample #: 10001140	

Sample Location Info



Sample Data

Container	Quantity	Preservative
40z. GLASS	1 ✓	AS IS

Date: 12-17-93 Time: 1107

Sampler: SMT / SMS Weather: 40° SUNNY

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TOUCHE DOG ESSOR

Field decon: Yes / No (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW GRADE Core Length: —

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, (Wetland) B Horizon, Outwash, Etc.)

Munsell Color: DUSKY ~~DARK~~ YELLOWISH BROWN (SMS) 10 YR 2/2 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: N/K

Appearance: DUSKY ~~DARK~~ YELLOWISH BROWN (SMS) FINE TO MED SAND

Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

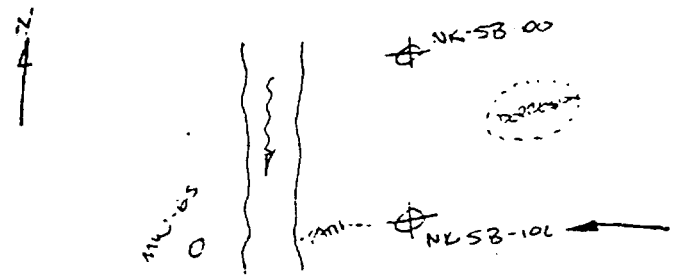
Client/Project Name: PRATT & WHITNEY EAST HARTFORD | Project #: 93-221A9

Project Location: EAST HARTFORD, CT

Sample #: 10001147

Sampling Location: NK-SB-102

Sample Location Info



GO SOUTH PAST DEPRESSION, STAYING INSIDE SURFACE WATER OF CO-2 MW-65 AND FOLLOW PATH WITH BRUSH

Sample Data

Container	Quantity	Preservative
4 oz. GLASS	1	AS IS

Date: 12-17-93 Time: 1040

Sampler: JMT / SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) - SINGLE DEPRESSOR

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BAG GRAB Core Length: —

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, (Wetland), B Horizon, Outwash, Etc.)

Munsell Color: DUSKY YELLOWISH BROWN 10YR 2/2 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: N/A

Appearance: DUSKY YELLOWISH BROWN FINE TO MED SAND

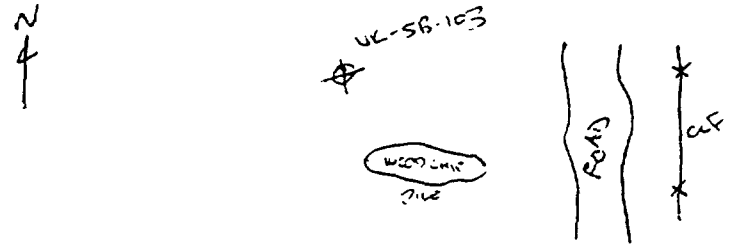
Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY	Project #: 93-2214
Project Location: EAST HARTFORD, CT	Sampling Location: NL-SB-103
Sample #: 10001148	

Sample Location Info



Sample Data

Container	Quantity	Preservative
4oz. GLASS	1 ✓	ASIS

Date: 12-17-93 Time: 1126

Sampler: JMT / SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TEFLON DEPRESSOR

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW DRIVINGS Core Length: —

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, (Wetland) B Horizon, Outwash, Etc.)

Munsell Color: DISKY YELLOWISH BROWN 10YR 2/2 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: WOOD CHIPS

Appearance: DARK YELLOW BROWN FINE TO MED SAND

Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL
Environmental
Field Services

Client/Project Name: PRATT & WHITNEY

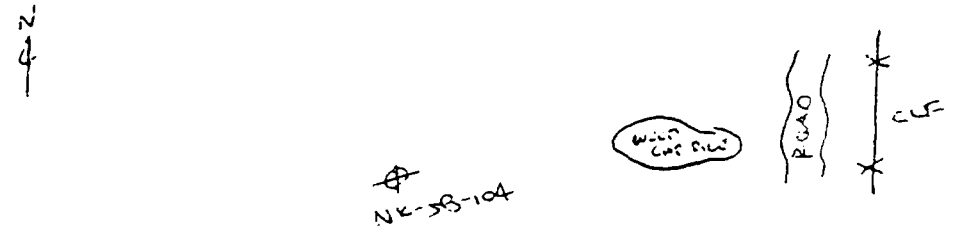
Project #: 93-2.21 A9

Project Location: EAST HARTFORD, CT

Sampling Location: NK-SB-104

Sample #: 10001149

Sample Location Info



Sample Data

Container	Quantity	Preservative
4 oz. GLASS	1	ASIS

Date: 12-17-93 Time: 1133

Sampler: SMT / SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TOUCH DEPRESSOR

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORIGINS Core Length: —

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, (Wetland), B Horizon, Outwash, Etc.)

Munsell Color: DUSKY YELLOWISH BROWN 10YR 2/2 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: N/A

Appearance: SEE ABOVE

Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY	Project #: 93-221A9
Project Location: EAST HARTFORD, CT	Sampling Location: NL-SB-105
Sample #: 10001150	

Sample Location Info

Sample Data

Container	Quantity	Preservative
4 OZ-GLASS	1 ✓	ASIS

Date: 12-17-93 Time: 1147

Sampler: JMT / SMD Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TEFLON DISPOSABLE

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, (Wetland), B Horizon, Outwash, Etc.)

Munsell Color: DUSKY YELLOWISH BROWN 10YR 2/2 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: WOOD CHIPS

Appearance: SEE ABOVE

Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY

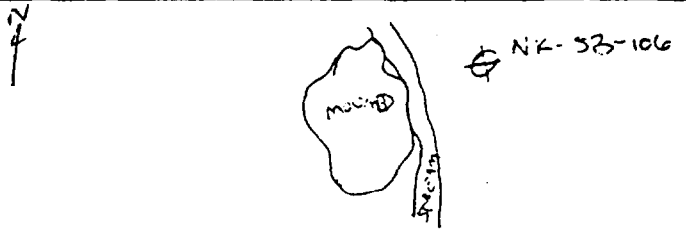
Project #: 93-22.A9

Project Location: EAST HARTFORD

Sampling Location: NK-SB-106

Sample #: 10001151

Sample Location Info



Sample Data

Container	Quantity	Preservative
4 oz. GLASS	1	AS IS

Date: 12-17-93 Time: 1238

Sampler: JMT/SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TAPE DEPRESSOR

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: —— Instrument: ——

Sample Depth: BELOW ORGANICS Core Length: ——

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: DUSKY YELLOWISH BROWN 10 YR 2/2 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: N/A

Appearance: SEE ABOVE

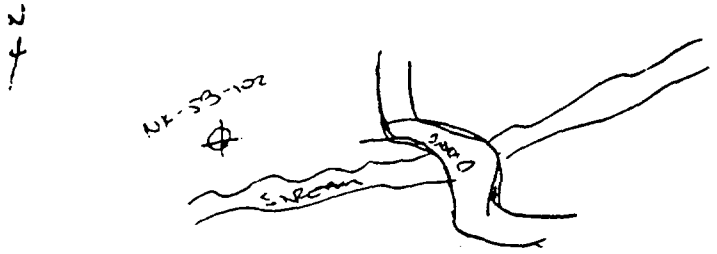
Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY	Project #: 93-221A9
Project Location: EAST HARTFORD, CT	Sampling Location: NK-SB-107
Sample #: 100152.	

Sample Location Info



Sample Data

Container	Quantity	Preservative
4 oz. GLASS	1	AS IS

Date: 12-17-93 Time: 1220

Sampler: JMT/SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TONGUE DEPRESSOR

Field decon: Yes / No / (Dedicated)

Type of Sample (Grab) Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / Soil Type (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: DUSKY YELLOWISH BROWN 10YR 2/2 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: N/A

Appearance: SEE ABOVE

Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY	Project #: 93-221 A7
Project Location: EAST HARTFORD CT	Sampling Location: NK-SB-108
Sample #: 10001153	

Sample Location Info

N

NK-SB-108

Sample Data

Container	Quantity	Preservative
4 oz. GLASS	1	ASTM

Date: 12-17-93 Time: 1310

Sampler: JMT / SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TEFLON DEPRESSOR

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / Soil Type (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: RUSTY YELLOWISH BROWN 10YR 2/2 Grain Size: FINE TO MED. SAND

Sample Description Foreign Material: N/A

Appearance: SAME ABOVE

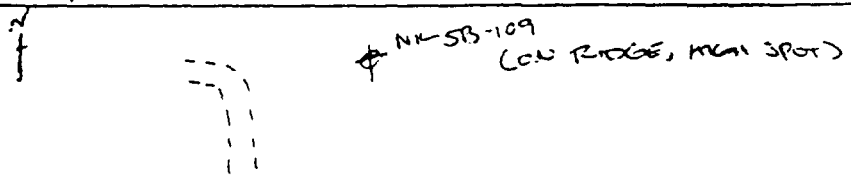
Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY
Project #: 93-221A9
Project Location: EAST HARTFORD, CT
Sampling Location: NK-SB-109
mple #: 1600 11 54

Sample Location Info



Sample Data

Container	Quantity	Preservative
4 oz. GLASS	1 ✓	AS IS

Date: 12-17-93 Time: 1440
Sampler: JMT / SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TONGUE DEPRESSOR
Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: BROWNISH BLACK 5YR 2/1 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: N/A

Appearance: SEE ABOVE

Comments:

Soil Sampling Field Data Sheet

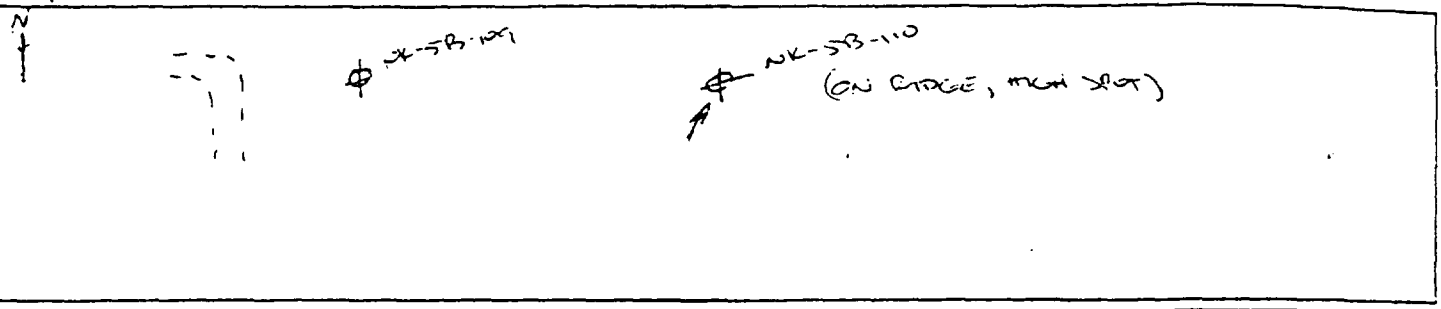
FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY | Project #: 93-224A9

Project Location: EAST HARTFORD, CT | Sampling Location: NK-SB-110

Sample #: 10001155

Sample Location Info



Sample Data

Container	Quantity	Preservative
4 oz. GLASS	1 ✓	AS IS

Date: 12-17-93 Time: 1445

Sampler: JMT/SMB Weather: 40 SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TOMCAT DEPRESSOR

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / Soil Type (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: BLUISH BLACK 5YR 2/1 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: N/A

Appearance: SEE ABOVE

Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY

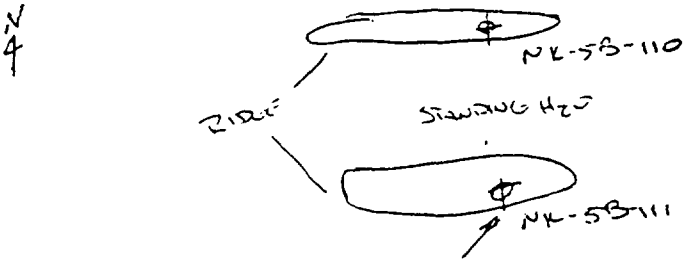
Project #: 93-221A9

Project Location: EAST HARTFORD, CT

Sampling Location: NK-SB-111

Sample #: 10001157

Sample Location Info



Sample Data

Container	Quantity	Preservative
4 oz. GLASS	1	AS IS

Date: 12-17-93 Time: 1452

Sampler: JMT / SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / Other TRIPOD DOPPLER

Field decon: Yes / No / Dedicated

Type of Sample: Grab / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / Soil Type (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: BROWNISH BLACK 5YR 2/1 Grain Size: FINE TO MED. SAND

Sample Description Foreign Material: N/A

Appearance: SEE ABOVE

Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY

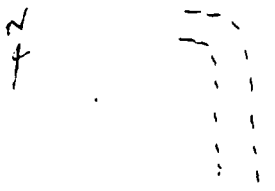
Project #: 93-221-A9

Project Location: EAST HARTFORD CT

Sampling Location: NK-SB-112

mple #: 100011 SO

Sample Location Info



Sample Data

Container	Quantity	Preservative
4 OZ. GLASS	1 ✓	AS IS

Date: 12-17-93 Time: 1501

Sampler: JMT / SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / **Split Spoon**
Trowel / (Other) TONGUE DEPRESSOR.

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / Soil Type (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: BLACKISH BLACK 5YR2/1 Grain Size: FINE TO MED SAND

Sample Description Foreign Material: N/A

Appearance: SEE ABOVE

Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL
Environmental
Field Services

Client/Project Name: PRATT & WHITNEY
Project #: 93-221A9
Project Location: EAST HARTFORD, CT.
Sample #: 10001158
Sampling Location: NK-SB-113

Sample Location Info

Sample Data

Container	Quantity	Preservative
4oz. GLASS	1 ✓	ASIS

Date: 12-17-93 Time: 1625
Sampler: JMT / SMS Weather: COLD SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TONGUE DEPRESSOR
Field decon: Yes / No (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, (Wetland) B Horizon, Outwash, Etc.)

Munsell Color: DUSKY YELLOWISH BROWN 10 YR 2/2 Grain Size: FINE, MED. & COARSE SAND

Sample Description Foreign Material: N/A

Appearance: SEE ABOVE

Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY | Project #: 93-221A9

Project Location: EAST HARTFORD, CT | Sampling Location: NK-SB-114

Sample #: 10001159

Sample Location Info

Sample Data

Container	Quantity	Preservative
4 OZ. GLASS	1	AS IS

Date: 12-17-93 Time: 1405

Sampler: JMT / SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TANGLE DEPRESSOR

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: MED YELLOWISH BROWN 10 YR 5/4 Grain Size: FINE MED & COARSE SAND

Sample Description Foreign Material: N/A

Appearance: SEE ABOVE

Comments:

Soil Sampling Field Data Sheet

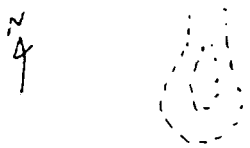
FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY | Project #: 93-221A9

Project Location: EAST HARTFORD, CT | Sampling Location: NK-SB-115

mple #: 10001160

Sample Location Info



NKSB-115

Sample Data

Container	Quantity	Preservative
4oz. GLASS	1 ✓	ICE

Date: 12-17-93 Time: 1412

Sampler: JMT / SMS Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) TONGUE DEPRESSOR

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: Sediment / (Soil Type) (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: MOD. YELLOWISH BROWN 10YR 5/4 Grain Size: FINE, MED. & COARSE SAND

Sample Description Foreign Material: N/A

Appearance:

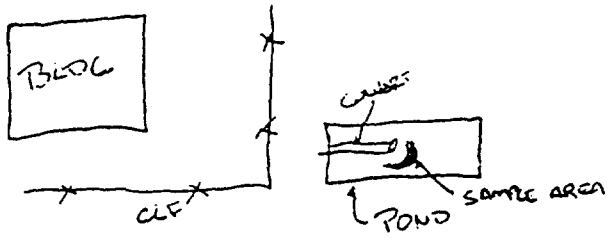
Comments:

Soil Sampling Field Data Sheet

FUSS&O'NEILL Environmental Field Services

Client/Project Name: PRATT & WHITNEY	Project #: 93-221A9
Project Location: EAST HARTFORD, CT	Sampling Location: NK-WC-100
Sample #: 100011 GH	

Sample Location Info



Sample Data

Container	Quantity	Preservative
1l Amber	2 ✓	4°C

Date: 12-17-93 Time: 1350

Sampler: _____ Weather: 40° SUN

Sampling Device: Auger / Core Sampler / Shovel / Split Spoon
Trowel / (Other) SURFACE WATER SCOOP

Field decon: Yes / No / (Dedicated)

Type of Sample: (Grab) / Composite /
Other _____

Description Data

Organic Vapor Reading: — Instrument: —

Sample Depth: BELOW ORGANICS Core Length: —

Sample Description: (Sediment) / Soil Type (ex. Lacustrine, Wetland, B Horizon, Outwash, Etc.)

Munsell Color: BROWNISH BLACK 5YR 2/1 Grain Size: SAND FINE TO MED SAND

Sample Description Foreign Material: ORGANICS

Appearance: SEE ABOVE, SATURATED

Comments: AT END CULVERT IS RIP RAP NO SEDIMENT. SEE SKETCH FOR LOCATION.

DRAWINGS

US EPA New England
RCRA Document Management System
Image Target Sheet

RDMS Document ID # 2651

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-5

Purpose of Target Sheet:

[X] Oversized (in Site File) **[ ] Oversized (in Map Drawer)**

[ ] Page(s) Missing (Please Specify Below)

[ ] Privileged **[ ] Other (Provide Purpose Below)**

Description of Oversized Material, if applicable:

DRAWING TM4-1: BACKGROUND SOIL INVESTIGATIONS, SOIL TYPE DISTRIBUTION

[X] Map **[ ] Photograph** **[ ] Other (Specify Below)**

*** Please Contact the EPA New England RCRA Records Center to View This Document ***

US EPA New England
RCRA Document Management System
Image Target Sheet

RDMS Document ID # 2651

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-5

Purpose of Target Sheet:

[X] Oversized (in Site File) [ ] Oversized (in Map Drawer)

[ ] Page(s) Missing (Please Specify Below)

[ ] Privileged [ ] Other (Provide Purpose Below)

Description of Oversized Material, if applicable:

DRAWING TM4-2: BACKGROUND SOIL INVESTIGATIONS, NORTH KLONDIKE AREA, LOCATION & CONSTITUENTS DETECTED MAP

[X] Map [ ] Photograph [ ] Other (Specify Below)

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US EPA New England
RCRA Document Management System
Image Target Sheet

RDMS Document ID # 2651

Facility Name: PRATT & WHITNEY - MAIN STREET

Facility ID#: CTD990672081

Phase Classification: R-5

Purpose of Target Sheet:

[X] Oversized (in Site File) [ ] Oversized (in Map Drawer)

[ ] Page(s) Missing (Please Specify Below)

[ ] Privileged [ ] Other (Provide Purpose Below)

Description of Oversized Material, if applicable:

DRAWING TM4-3: GLACIOLACUSTRINE SEDIMENT, SAMPLING LOCATIONS, LOCATION & CONSTITUENTS DETECTED MAP

[X] Map [ ] Photograph [ ] Other (Specify Below)

* Please Contact the EPA New England RCRA Records Center to View This Document *

DRAFT

TECHNICAL MEMORANDUM 6
SURFACE WATER AND SEDIMENT SAMPLING

SUMMARY
SITE INVESTIGATION AND REMEDIATION REPORT
AIRPORT/KLONDIKE AREA
AT
PRATT & WHITNEY
EAST HARTFORD, CONNECTICUT
EPA ID No. CTD990672081

Prepared for:

PRATT & WHITNEY
400 Main Street
East Hartford, Connecticut 06108

Prepared by:

LOUREIRO ENGINEERING ASSOCIATES
100 Northwest Drive
Plainville, Connecticut 06062

LEA Comm. No. 68V8124

Table of Contents

TABLES

DRAWINGS

Acronyms

AEL	Averill Environmental Laboratory, Inc.
ALPC	Aquatic Life Protection Criteria
DEP	State of Connecticut Department of Environmental Protection
DPH	State of Connecticut Department of Public Health
H&A	Haley & Aldrich, Inc.
LEA	Loureiro Engineering Associates, P.C.
M&E	Metcalf & Eddy, Inc.
P&W	Pratt & Whitney
PPE	Personal Protective Equipment
QA/QC	Quality Assurance/Quality Control
QUANT	Quanterra Environmental Services, Inc.
RCSA	Regulations of Connecticut State Agencies
RSR	Remediation Standard Regulation
SOP	Standard Operating Procedure
TM	Technical Memoranda
VOC	Volatile Organic Compound
WQS	Water Quality Standards

1. INTRODUCTION

1.1 Purpose and Objective

This Technical Memorandum (TM) presents the methodology and analytical results of the surface water and sediment sampling conducted in the Airport/Klondike Area (Site) of the Pratt & Whitney (P&W) facility located at 400 Main Street (Main Street facility) in the Town of East Hartford, Connecticut. Surface water and sediment were sampled by Loureiro Engineering Associates, P.C. (LEA) as part of the Site investigation activities to characterize the nature and the distribution of contaminants in the surface water environment at the Site.

1.2 Background

The Airport/Klondike Area is located on the eastern portion of the P&W Main Street facility on the east side of the main plant, north of Brewer Street and south of Silver Lane. The Airport/Klondike Area consists of four study areas that include the North and South Airport Areas and the North and South Klondike Areas. Previous investigations at the Site performed from 1990 through 1993 resulted in the installation and sampling of soil borings, groundwater monitoring wells and temporary wellpoints, surface water and sediment throughout the Airport/Klondike Area.

The first surface water sampling event was conducted on November 21 and 22, 1991 during the Site-Wide Environmental Monitoring Program at the Main Street facility by Haley & Aldrich, Inc. (H&A). Thirteen surface water samples were collected from selected locations in the Airport/Klondike Area, NK-SW-01 through NK-SW-06 in the North Klondike Area, SK-SW-01 through SK-SW-04 in the South Klondike Area, and SA-SW-01 through SA-SW-03 in the South Airport Area. These locations correspond to locations of stream flow measurements conducted during the 1990 Preliminary Reconnaissance Survey of the Airport/Klondike Area by Westinghouse Environmental and Geotechnical Services, Inc. (Westinghouse).

1.3 Scope

This TM covers the sampling, analyses, and rationale for the surface water and sediment sampling conducted in the Airport/Klondike Area. The methods and techniques discussed are those used by LEA during the period from approximately 1994 through 1997. These methods and techniques have also been used, to a greater or lesser extent, by other consultants and contractors working at the site at various times.

1.4 General Geologic and Hydrogeologic Conditions

The geologic and hydrogeologic characteristics of the Site are discussed in detail in the main body of this report. In general, the surficial materials in which the majority of the monitoring wells are screened, consist of medium to fine grained sands with trace levels of fine gravels and coarse sands. These sediments are generally post-glacial, fluvial deposits associated with the Connecticut River, although in many places the upper portion of these sediments have been anthropogenically disturbed during on-site construction activities. Beneath the fluvial sediments are glaciolacustrine sediments, primarily laminated silts and clays, associated with glacial Lake Hitchcock. The basal sediment layer over most of the area is glacial till and stratified drift. Bedrock in the general East Hartford area consists of Triassic Age, interbedded arkoses and basalts. Bedrock in the area has a general slight dip eastward cut by widespread steep faults.

The regional drainage basin is the Upper Connecticut River Basin. Regional flow in the unconsolidated materials in this part of the basin is to the west, towards the Connecticut River. Local groundwater flow is also controlled to some extent by local drainage sub-basins and topography. The upper portion of the unconsolidated sediments serves as the primary aquifer in the area. Groundwater flow in the bedrock is primarily within fractures and fault planes, and to a lesser extent within the rock matrix. The local bedrock aquifer would be adequate as a residential water supply source, but groundwater yields are typically too low to be of commercial or industrial use.

1.5 Surface Water/Sediment Sampling Locations and Rationale

The initial surface water/sediment sampling locations, NK-SW-01 through NK-SW-06, SK-SW-01 through SK-SW-04, and SA-SW-01 through SA-SW-03, were located at the sites of the stream flow measurement locations established by Westinghouse as part of the Preliminary Reconnaissance Survey. These stream flow measurement locations were established, along with additional stream flow measurements stations throughout the Main Street facility, to provide data to estimate stream flow and groundwater contributions to stream flow.

Additional surface water/sediment sampling locations, NA-SW-01 and NA-SW-02, SK-SW-05 through SK-SW-17, andSA-SW-04 through SA-SW-10, were added during this site investigation to provide coverage in the North Airport Area and to provide enhanced data coverage in the South Klondike and South Airport Areas. The location of all of the surface water and sediment sampling locations are shown on Drawing TM6-1. A summary of the sampling locations and the location descriptions for the surface water and sediment sampling locations is presented in Table 1.

2. METHODOLOGY

This section presents the methods and techniques used to sample surface water and sediment in the streams in the Airport/Klondike Area. These methods were used by LEA, although some of the general procedures and methods were also used by previous consultants and contractors who sampled surface water and sediment. This section describes the general procedures that were used during the sampling of surface water and sediment at the Site. Also discussed are variations and exceptions to the general methodology and the reasons that these variations and exceptions were required.

2.1 General Procedures

This TM discusses the sampling methods for surface water and sediment sampling conducted in the Airport/Klondike Area since 1991. Where possible, reference is made to techniques and methodologies used by previous consultants and contractors. However, this information has been taken from available literature and does not constitute first-hand knowledge of the sampling methodologies. Surface water and sediment sampling conducted during the most recent investigation activities is discussed in greater detail.

2.1.1 Surface Water Sampling Methods

The first surface water sampling event was conducted on November 21 and 22, 1991 during the Site-Wide Environmental Monitoring Program at the Main Street facility by H&A. Subsequent surface water sampling events were conducted in 1992 and 1993 by H&A and M&E. Samples collected during these sampling events were conducted in the same general manner as described below.

Surface water sampling during the most recent investigation activities was conducted in general accordance with the LEA Standard Operating Procedure (SOP) *Standard Operating Procedure for Shallow Surface Water Sampling and Flow Measurement.* Surface water sampling locations were located in the field by survey stakes and other physical markers. The in-stream sampling locations consisted of staff gauges with surveyed reference elevations. The staff gauges consisted of a steel rod driven into the firm bottom of the stream bed.

In some cases, the staff gauges consisted of open-ended steel pipe driven to 1 to 2 feet below the stream bed. These locations served as river piezometers to allow the synoptic measurement of surface water and groundwater elevation data. Information regarding groundwater surface water interactions is presented in TM 2, *Water Level Measurements and Site Survey Data.*

After identifying the appropriate sampling location, pre-labeled laboratory-supplied sample containers, appropriate to the respective analyses were readied. The sampling location was approached from a downstream direction, disturbing the bottom sediments as little as possible, and the depth to the surface water surface from the surveyed reference point was gauged. Sample containers were filled directly from the stream flow by immersion of the container into the stream waters. Sample information, including date and time, location, sample number, depth to the surface water, and pertinent observations were recorded on the appropriate field forms.

After collection, the samples were placed into iced coolers for transportation to the analytical laboratory under chain-of-custody control. Quality assurance, quality control, and sample custody particulars are discussed in Section 2.3 of this TM.

2.1.2 Sediment Sampling Methods

The first sediment sampling event was conducted on November 21 and 22, 1991 during the Site-Wide Environmental Monitoring Program at the Main Street facility by H&A. Subsequent sediment sampling events were conducted in 1992 and 1993 by H&A and M&E. Samples collected during these sampling events were conducted in the same general manner as described below.

Sediment sampling during the most recent investigation activities was conducted in general accordance with the LEA SOP *Standard Operating Procedure for Sediment Sampling in Shallow Rivers and Ponds*. Sediment samples were collected at the same spatial locations as surface water samples. Sediment samples were collected using pre-cleaned, stainless steel hand trowels or scoops, or hand augers. After collection, the sampling device was brought to the surface and the sediment was transferred to pre-labeled laboratory-supplied sampling containers using stainless-steel spatulas.

After collection, the samples were placed into iced coolers for transportation to the analytical laboratory under chain-of-custody control. Quality assurance, quality control, and sample custody particulars are discussed in Section 2.3 of this TM.

2.2 Analytical Parameters

The analytical parameters selected for the surface water samples collected in November 1997 were the same as those described in the Work Plan, and include VOCs, and the RCRA 8 metals plus nickel and zinc. The surface water samples were collected directly into pre-preserved laboratory supplied containers.

The analytical parameters selected for the sediment samples collected in November 1997 were the same as those described in the Work Plan, and include volatile organic compounds (VOCs), and the RCRA 8 metals plus nickel and zinc.

2.3 Quality Assurance/Quality Control Procedures

Several Quality Assurance (QA) samples were collected to confirm the reliability and validity of the field data gathered during the Site investigation. Duplicate samples were used to provide a measurement of the consistency of samples from the same sampling station and an estimate of variance and bias. Trip and equipment blanks were used to provide a measurement of cross-contamination sources, decontamination efficiency, and other potential errors that can be introduced from sources other than the sample.

Trip blanks were used on every sampling day, because samples were routinely analyzed for the presence of volatile organic compounds. Trip blanks were supplied by the analytical laboratory for each cooler/sampling event.

Equipment blanks submitted to off-site analytical laboratories were collected at the rate of approximately one equipment blank for every twenty soil samples submitted for analysis. Equipment blanks submitted to off-site laboratories were collected using laboratory-supplied distilled, de-ionized water using field decontaminated sampling equipment. Equipment blanks submitted to the LEA Analytical Laboratory were collected daily using the laboratory-supplied sampling water.

During the Site investigation, samples were collected for the purpose of defining the presence or absence of contamination. For this reason, the possession of samples, including QA/QC samples, was traceable from the time the samples were collected until they were analyzed. Chain-of-custody procedures were used to maintain and document sample possession from collection through analysis. The following documents identify samples and document possession:

Sample labels
Chain-of-custody record forms
Field notebooks/Field Sampling Records

The field sampler was responsible for the care and custody of the samples collected until they are transferred under the chain-of-custody procedures.

2.4 Data Management

Data management procedures were used in assure that field and laboratory data collected as part of the sampling events were properly and accurately transferred to the Site database maintained by LEA. Data management procedures were as outlined in the data management plan

The following describes the tasks of the data management team:

Samples collected during the investigations were identified using the following information:

- Site location
- Date and Time
- Sample matrix
- Sample type
- Sample point number

Field sample tracking activities focused on the timely tracking of information about field samples taken for the Site investigation. This information included sample identifiers, chain of custody information, sample station identifiers, sample characteristics, and sample locations. This was transmitted from field to office personnel through the use of daily field summary sheets and other project information tracking forms. Daily field summary sheets were completed by each field team leader. The daily field summary sheets detailed the daily activities conducted by the staff and contractors, hours logged by staff and contractors, problems encountered, general field observations, and samples submitted for analyses. Field summary sheets and project information tracking forms were submitted to the field activities coordinator at the end of each working day or as soon thereafter as possible. The summary sheets and forms, in turn, were placed in the central file.

Field Team Leaders completed, on a daily basis, a daily log sheet, which at a minimum detailed the people working in a given area, the hours worked, the tasks performed, the number and matrix of samples collected, and the number of samples shipped for analysis. The daily log sheets were submitted to the field activities coordinator.

Specifically, field sample tracking included the following tasks:

- Assignment of sample identification numbers and other sample identifiers to new samples to be taken, and entry to a tracking system
- Production of sample bottle labels from the tracking system

- Completion of Chain-of-Custody forms, and entry of this information to the tracking system
- Entry of additional tracking dates to the tracking system
- Quality Assurance (QA) checking of the sample tracking information, and processing of change requests
- Production of tracking reports and summary sheets, with distribution to appropriate project staff

A computer-based sample-tracking system, based on a dBase® storage and retrieval system, was used for sample tracking.

2.5 Decontamination of Materials and Equipment

The purpose of consistent decontamination procedures was to prevent the potential spread of contamination between boreholes and samples and from the immediate work area around the borehole. All equipment and materials used to collect sediment samples was decontaminated prior to initiating the sampling activities and between individual samples, as appropriate. Decontamination procedures are presented in the LEA SOP *Standard Operating Procedure for Soil Sampling*. Surface water samples were collected directly into the sample containers and decontamination procedures were not necessary.

Sampling equipment such as the bucket augers and stainless steel spatulas were decontaminated between uses in the field at the drilling site or the decontamination pad. Manual decontamination took place at the sampling site using a portable decontamination system consisting of small, portable trough to contain over-spray and potentially spilt decontamination fluids, and decontamination solutions in individual 5-gallon buckets or spray containers, as appropriate. The sampling equipment was decontaminated using the following procedure:

- Brush off gross soil particles.
- Wash and scrub equipment with phosphate-free detergent.
- Rinse equipment with deionized water.
- Rinse equipment with dilute nitric acid solution.
- Rinse equipment in deionized water.
- Rinse equipment with dilute methanol/water solution.
- Rinse equipment in deionized water.
- Allow equipment to air dry.

The decontamination water was maintained in 5-gallon buckets during use, and transferred to 55-gallon drums for disposal. LEA field personnel were responsible for preventing cross-contamination between soil samples collected for laboratory analysis. Sample preparation tables were covered with clean, disposable plastic. Clean, disposable plastic was also laid on the ground beneath the sample preparation tables and the decontamination solutions to catch dropped soil and spilt decontamination solutions.

2.6 Sampling Location Identifiers

Monitoring wells, piezometers, stream gauges, surface water and sediment sampling locations, and soil borings have been identified using a systematic method to prevent duplication of location identifiers. The system of location identifiers provides a relatively easy means of finding the referenced locations on site maps. All areas of the Pratt & Whitney East Hartford facilities, including the Andrew Willgoos Gas Turbine Laboratory, the Colt Street facility, and Main Street facility have been assigned two-letter identifiers based upon the common name for the area. These two-letter designations are presented in Table 4.

In addition, each type of sampling location has been assigned a two-letter designation to distinguish the various types of sampling locations possible. The two-letter designations for the various types of sampling locations are also presented in Table 4. Because of the large areas involved, the study areas that encompass the Airport/Klondike Area include the North and South Airport Areas and the North and South Klondike Areas. All monitoring and sampling locations have been given a location identifier based on their location in the Airport/Klondike Area, the type of sampling or monitoring location, and finally a sequential numeric identifier based upon the specific type of location. All surface water and sediment sampling locations are presented on Drawing TM6-1.

2.7 Waste Management

All spent decontamination fluids generated during sampling and gauging activities for the surface water and sediment sampling portion of the investigation were placed in 55-gallon closed-top drums supplied by P&W for subsequent off-site disposal by P&W. The drums were labeled, the locations contributing to each were listed, and the information tracked to aid in waste characterization and disposal.

2.8 Health and Safety

LEA field personnel conducted field activities in accordance with the LEA Site Health and Safety

Plan that was prepared for all of the investigation activities included on the Site. In general, surface water and sediment sampling was conducted in modified Level D personal protective equipment (PPE) consisting of safety glasses and surgical or nitrile gloves.

3. RESULTS

A total of thirty-five surface water and sediment sampling locations have been established in the Airport/Klondike Area: two in the North Airport Area; six in the North Klondike Area; ten in the South Airport Area; and, seventeen in the South Klondike Area. These surface water/sediment locations have been situated in Willow Brook, Pewterpot Brook, and various unnamed tributaries to these streams. The locations of these sampling points has been chosen to provide relatively complete coverage of the surface water bodies in the Airport/Klondike Area. These surface water/sediment sampling locations have been surveyed to provide a horizontal location data.

In some cases, the surface water/sediment sampling locations are simple staff gauges, from which surface water elevation data can be determined. In other cases the surface water/sediment sampling locations are river piezometers from which both surface water and groundwater elevation data can be determined.

3.1 Distribution of Substances in Surface Water

This section discusses the constituents detected in surface water samples from the latest sampling round from each of the sampling locations. Surface waters were last sampled in the North Airport Area at NA-SW-01 and NA-SW-02 in May 1993. In the North Klondike, surface waters were last sampled at locations NK-SW-02, NK-SW-04, and NK-SW-04 in June 1992, at locations NK-SW-01 and NK-SW-05 in May 1993, and at location NK-SW-06 in July 1997. In the South Airport Area, surface waters were last sampled at location SA-SW-03 in June 1992, at locations SA-SW-04 and SA-SW-06 in May 1993, and at locations SA-SW-01, SA-SW-02, SA-SW-05, and SA-SW-07 through SA-SW-10 in July 1997.

Surface water quality is not regulated under the Remediation Standard Regulations (RSR), Regulations of Connecticut State Agencies (RCSA) 22a-133k-1 *et. seq.* Surface water quality is regulated under the Water Quality Standards (WQS). The WQS direct that "*surface waters and sediments be free from chemical constituents in concentrations or combinations which will or can reasonably be expected to result in acute or chronic toxicity to aquatic organisms or impair the biological integrity of aquatic or marine ecosystems outside of any allocated zone of influence or which will or can reasonably be expected to bioconcentrate or bioaccumulate in tissues of fish, shellfish and other aquatic organisms to levels which will impair the health of aquatic organisms or wildlife or result in unacceptable tastes, odors or health risks to human consumers of aquatic life.*"

Groundwater discharge to surface water is regulated under the RSR through the Surface Water Protection Criteria (SWPC). The SWPC regulates the level of contaminants allowable in groundwater bodies which discharge to surface water bodies. Groundwater discharges to surface water is discussed in TM 3 *Groundwater Sampling and Quality*.

The constituents detected during the latest surface water sampling event for each surface water sampling location are shown on DrawingTM6-1.

3.1.1 Distribution of Volatile Organic Compounds

No volatile organic compounds (VOCs) were detected in any surface water sample collected in the North Airport Area.

In the North Klondike Area, methylene chloride was detected in surface water samples collected at sampling locations NK-SW-03, NK-SW-04, NK-SW-05, and NK-SW-06, in June 1992, however, methylene chloride was not detected in subsequent sampling of NK-SW-04, NK-SW-05, or NK-SW-06. NK-SW-03 has not been re-sampled since June 1992. Based on the fact that methylene chloride was detected only during this sampling event, these results may represent laboratory carry-through.

In the South Airport Area, no VOCs were detected in any of the surface water samples collected.

In the South Klondike Area, 1,2-dichloroethylene, cis-1,2-dichloroethylene, ethylbenzene, tetrachloroethylene, 1,1,1-trichloroethane, and trichloroethylene were detected during the latest sampling event for each sampling location.

There are no applicable aquatic life protection criteria (ALPC) in the current WQS for volatile organic compounds. The concentration of the VOCs and the locations at which specific VOCs were detected in sediment samples are shown on Drawing TM6-1.

3.1.2 Distribution of Metals

Metals detected in surface water samples collected in the North Airport and North Klondike include barium, copper, lead and zinc. Barium was detected in virtually all surface water samples collected. There is no applicable standard for barium in surface waters. Copper and lead were detected in the surface water sample collected at location NK-SW-02 at concentrations of 0.01 and 0.015 mg/l, respectively. The aquatic life protection criteria (ALPC) for copper and lead are 0.0143 and 0.034 mg/l, respectively. Zinc was detected in the sample collected at locations NK-

SW-01, NK-SW-03, NK-SW-05, and NK-SW-06 at concentrations of 0.02, 0.02, 0.022, and 0.0722 mg/l, respectively. The ALPC for zinc is 0.0353 mg/l.

In the South Airport Area, barium, lead, and zinc were detected. Barium was detected in surface water samples collected from SA-SW-03, SA-SW-04, SA-SW-05, and SA-SW-06, at concentrations of 0.04, 0.037, 0.044, and 0.45 mg/l, respectively. Lead was detected in the sample collected from SA-SW-02 at a concentration of 0.0044 mg/l. The ALPC for lead is 0.034 mg/l. Zinc was detected in the samples collected from locations SA-SW-01, SA-SW-02, SA-SW-04, and SA-SW-07, at concentrations of 0.0258, 0.0370, 0.028, and 0.724 mg/l, respectively. The ALPC for zinc is 0.0353 mg/l.

In the South Klondike Area, arsenic, barium, cadmium, chromium, lead, mercury, selenium, and zinc were detected. Arsenic was detected in the surface water sample collected from location SK-SW-08 at a concentration of 0.0189 mg/l. The ALPC for arsenic is 0.360 mg/l. Barium was detected in surface water samples collected at locations SK-SW-01, SK-SW-02, SK-SW-04, SK-SW-05, and SK-SW-08, at concentrations of 0.03, 0.033, 0.048, 0.044, and 0.209 mg/l, respectively. Cadmium was detected in the sample collected from SK-SW-08 at a concentration of 0.0391 mg/l. The ALPC for cadmium is 0.0018 mg/l. Chromium was detected in the samples collected at locations SK-SW-07, SK-SW-08, and SK-SW-10 at concentrations of 0.0345, 0.693, and 0.184 mg/l, respectively. The ALPC for chromium is 0.980 mg/l. Lead was detected in the surface water samples collected at locations SK-SW-07, SK-SW-08, and SK-SW-10 at concentrations of 0.0068, 0.132, 0.0133 mg/l, respectively. The ALPC for lead is 0.034 mg/l. Mercury was detected in the sample collected at SK-SW-08 at a concentration of 0.00066 mg/l. The ALPC for mercury is 0.0024 mg/l. Selenium was detected in the sample collected from SK-SW-08 at a concentration of 0.0134 mg/l. The ALPC for selenium is 0.020 mg/l. Zinc was detected in the samples collected at SK-SW-03, SK-SW-07, SK-SW-08, SK-SW-10, SK-SW-11, and SK-SW-16, at concentrations of 0.0341J, 0.105, 0.151, 0.0572, 0.0305, and 0.0547 mg/l, respectively. The ALPC for zinc is 0.0353 mg/l.

The distribution of metals detected in surface water is shown on Drawing TM6-1.

3.1.3 Distribution of Semivolatile Organic Compounds and Total Petroleum Hydrocarbons

There were no SVOCs or TPH detected in any surface water sample collected from locations in the North Airport, South Airport, or North Klondike during the latest sampling event.

Semivolatile organic compounds were detected in two surface water samples collected in the South Klondike Area. In surface water samples collected at SK-SW-12 and SK-SW-13, 3-cresol/4-cresol was detected. The analytical results "J" flag indicates that the concentration was estimated because the analysis was performed after the holding period expired. Note that in the data tables presented with this TM the concentrations of the 3-cresol and 4-cresol are reported separately and both are flagged with a "#" indicating that the laboratory was unable to distinguish the isomers and reported the total concentration detected. For both of these analyses, the analytical results from the original extractions were rejected by the laboratory because of poor surrogate recoveries. Both analytes from both samples were originally reported as not detected at a detection limit equal to the currently reported concentrations. The samples were re-extracted and re-analyzed, however, the second extractions were performed after the holding times for the analyses had expired. Because of the discrepancy between the analysis date and the holding time, all reported concentrations were reported as estimated. There are no applicable surface water criteria for 3-cresol or 4-cresol.

Total petroleum hydrocarbons were detected in three surface water samples collected in the South Klondike. Total petroleum hydrocarbons were detected in surface water SK-SW-12, SK-SW-13, and SK-SW-14. All of the concentrations were flagged "J" indicating that the reported concentrations were estimated because the reported concentration was below the reporting limit. There is no applicable standard for TPH in surface waters.

The distribution of SVOCs detected in surface water samples is shown on Drawing TM6-1.

3.1.4 Distribution of Polychlorinated Biphenyls

No polychlorinated biphenyls (PCBs) were detected in any of the surface water collected.

3.2 Distribution of Substances in Sediment

This section discusses the constituents detected in sediment samples from the latest sampling round from each of the sampling locations. Sediments were last sampled in the North Airport Area at NA-SD-01, NA-SD-02, NA-SD-03, and NA-SD-04 in May 1993. In the North Klondike, sediment was last sampled at locations NK-SD-02, and NK-SD-03 in May 1993, at locations NK-SD-04, NK-SD-07, and NK-SD-08 in June 1993, and at location NK-SD-01, NK-SD-09, and NK-SD-19 in July 1997. In the South Airport Area, sediment was last sampled at locations SA-SD-03, SA-SD-5, and SA-SD-07 in May 1993, and at locations SA-SD-01, SA-SD-02, SA-SD-04, SA-SD-06, SA-SD-08, and SA-SD-09 in July 1997. In the South Klondike Area sediment was last sampled at locations SK-SD-01, SK-SD-03, and SK-SD-05 in May 1993, at

location SK-SD-06 in June 1993, at locations SK-SD-12 through SK-SD-15 in August 1996, and at locations SK-SD-02, SK-SD-04, SK-SD-06 through SK-SD-11, SK-SD-16, and SK-SD-17 in July 1997.

Sediment quality is not regulated under the Remediation Standard Regulations (RSR), Regulations of Connecticut State Agencies (RCSA) 22a-133k-1 *et. seq.* However, sediment quality is regulated under the Water Quality Standards (WQS). The WQS direct that "*surface waters and sediments be free from chemical constituents in concentrations or combinations which will or can reasonably be expected to result in acute or chronic toxicity to aquatic organisms or impair the biological integrity of aquatic or marine ecosystems outside of any allocated zone of influence or which will or can reasonably be expected to bioconcentrate or bioaccumulate in tissues of fish, shellfish and other aquatic organisms to levels which will impair the health of aquatic organisms or wildlife or result in unacceptable tastes, odors or health risks to human consumers of aquatic life.*"

The constituents detected during the latest sediment water sampling event for each sediment sampling location are shown on Drawing TM6-1.

3.2.1 Distribution of Volatile Organic Compounds

No VOCs were detected in sediment samples collected in the North Airport Area.

In the North Klondike Area, acetone, methyl ethyl ketone, methylene chloride, and 1,1,1-trichloroethane were detected in sediment samples. Volatile organic compounds were detected in sediment samples collected at locations NK-SD-01, NK-SD-02, NK-SD-04, and NK-SD-08.

In the South Airport Area, acetone, methyl ethyl ketone, methylene chloride, and toluene were detected in sediment samples. Volatile organic compounds were detected in sediment samples collected from SA-SD-01, SA-SD-02, SA-SD-08, and SA-SD-09.

In the South Klondike Area, acetone, 1,1-dichloroethane, cis-1,2-dichloroethylene, ethylbenzene, methyl ethyl ketone, methylene chloride, tetrachloroethylene, trichloroethylene, and toluene were detected in sediment samples. Volatile organic compounds were detected in sediment samples collected at locations SK-SD-01, SK-SD-02, SK-SD-05, SK-SD-07, SK-SD-08, SK-SD-09, SK-SD-10, SK-SD-11, SK-SD-12, and SK-SD-16.

The concentration of the VOCs and the locations at which specific VOCs were detected in sediment samples are shown on Drawing TM6-1.

3.2.2 Distribution of Metals

Metals are ubiquitously distributed throughout the sediments at the Site. Arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, silver, and zinc have been detected in the sediments in the Airport/Klondike Area. These metals may be the result of natural processes or anthropogenic activities. No numerical standards currently apply to sediment quality. The concentrations of metals detected in sediment samples is presented in Tables 6 and 7.

3.2.3 Distribution of Semivolatile Organic Compounds and Total Petroleum Hydrocarbons

Semivolatile organic compounds were detected in one sediment sample from the North Airport Area. Benzo[b]fluoranthene, fluoranthene, phenanthrene, and pyrene were detected in sediment sample NA-SD-01. In the North Klondike Area, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene were detected in sediment sample NK-SD-07. No SVOCs were detected in the sediment samples from the South Airport Area. In the South Klondike Area, fluoranthene and pyrene were detected in SK-SD-05.

Total petroleum hydrocarbons were not detected in sediment samples for the Site.

The concentration of the SVOCs and the locations at which specific SVOCs were detected in sediment samples are shown on Drawing TM6-1.

3.2.4 Distribution of Polychlorinated Biphenyls

Polychlorinated biphenyls have been detected in sediment samples collected from location NK-SD-04, SK-SD-01, and SK-SD-07. No PCBs were detected in sediment samples collected from the North or South Airport Areas.

The concentration of the PCBs and the locations at which PCBs were detected in sediment samples are shown on Drawing TM6-1.

3.3 Evaluation of Results

Surface water and sediment samples were collected from various stream locations throughout the Airport/Klondike Area. Analyses of these samples has indicated the presence of a variety of constituents in the surface waters and sediments in the area. Surface water and sediment quality are governed by the Water Quality Standards, numerical standards have been promulgated only for surface water quality, no numeric standards have been created for sediment.

Exceedances of the applicable surface water quality criteria in the WQS were noted for zinc, lead, and cadmium. In the North Airport Area, NA-SW-02, in the North Klondike Area, NK-SW-06, in the South Airport Area, SA-SW-02 and SA-SW-07, and in the South Klondike Area, SK-SW-07, SK-SW-08, SK-SW-09, SK-SW-10, and SK-SW-16, all exceeded the ALPC for zinc of 0.353 mg/L. In the South Klondike Area, SK-SW-08 exceeded the applicable ALPC for lead of 0.034 mg/L. In the South Klondike Area, SK-SW-08 and SK-SW-09 exceeded the applicable ALPC for cadmium of 0.0018 mg/L.

No WQS standards currently exist for VOCs in surface waters, although the VOCs in groundwater discharging to surface waters are regulated under the RSR. Acetone, 1,1-dichloroethane, cis-1,2-dichloroethylene, ethylbenzene, methyl ethyl ketone, methylene chloride, tetrachloroethylene, 1,1,1-tetrachloroethane, trichloroethylene, and toluene have been detected in surface water and sediment samples collected in the North Klondike, South Airport, and South Klondike Areas.

REFERENCES

Haley & Aldrich, Inc., January, 1993, *Site-Wide Environmental Monitoring Report, Pratt & Whitney, East Hartford, Connecticut*, prepared for Pratt & Whitney.

Metcalf & Eddy, Inc. July 1993, *Draft Report - Klondike Area Site Investigation, UTC / Pratt & Whitney Facility, East Hartford, CT,* prepared for Pratt & Whitney.

Westinghouse Environmental and Geotechnical Services, Inc. November 1990, *Current Assessment Summary Report*, Pratt & Whitney, East Hartford, Connecticut, unpublished report for Pratt & Whitney.

Westinghouse Environmental and Geotechnical Services, Inc. 1990, *Preliminary Reconnaissance Survey of the Klondike Area*, Pratt & Whitney, East Hartford, Connecticut, unpublished report for Pratt & Whitney.

TABLES

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Table 1
Location and Description of Surface Water/Sediment Sampling Locations
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Location	Location Description
NA-SW-01	
NA-SW-02	
NK-SW-01	Background tributary in Suntan Area
NK-SW-02	Northern boundary tributary in Suntan Area
NK-SW-03	Suntan tributary above southern boundary tributary
NK-SW-04	Southern boundary tributary in Suntan Area
NK-SW-05	Chemical Storage Area tributary above Suntan Area tributary
NK-SW-06	Suntan Area tributary above East Service Road
SA-SW-01	Suntan Area tributary before confluence with Willow Brook
SA-SW-02	Suntan Area tributary above Pewterpot Brook
SA-SW-03	Pewterpot Brook tributary above Suntan Area tributary
SA-SW-04	
SA-SW-05	
SA-SW-06	
SA-SW-07	
SA-SW-08	
SA-SW-09	
SA-SW-10	
SK-SW-01	Upstream end of Klondike Area tributary
SK-SW-02	Klondike Area tributary near Virgin Products Storage Area
SK-SW-03	Klondike Area tributary above Pewterpot Brook
SK-SW-04	Pewterpot Brook above Klondike Area
SK-SW-05	
SK-SW-06	
SK-SW-07	
SK-SW-08	
SK-SW-09	
SK-SW-10	
SK-SW-11	
SK-SW-12	
SK-SW-13	
SK-SW-14	
SK-SW-15	
SK-SW-16	
SK-SW-17	

Table 2
Area and Sampling Type Identifiers
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Area Designation	Area	Sampling Type Identifier	Explanation
AB	Within A Building	MW	Monitoring Well
BB	Within B Building	PZ	Piezometer
CB	Within C Building	SW	Surface Water
DB	Within D Building	SD	Sediment
EB	Within E Building	CC	Concrete Chip
FB	Within F Building	SS	Surface Soil
GB	Within G Building	SB	Soil Boring
HB	Within H Building		
JB	Within J Building		
KB	Within K Building		
LB	Within L Building		
MB	Within M Building		
CS	Colt Street Facility		
EA	Engineering Area		
ET	Experimental Test Airport Laboratory		
LM	Area Outside Buildings L and M		
NA	North Airport Area		
NT	North Test Area		
NW	North Willgoos Area		
PH	Powerhouse Area		
SA	South Airport Area		
SK	South Klondike Area		
ST	South Test Area		
SW	South Willgoos Area		
WT	Waste Treatment Area		
XT	Experimental Test Area		

Table 3

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SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING AND ANALYSES
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information							
Location ID	Sample ID	Sample Date	From (ft) To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extraction	Miscellaneous
NA-SD-01	03024051193	05/11/93		SD		x	X		x	x	X	X	
NA-SD-02	03014051193	05/11/93		SD		x			x		X	X	
NA-SD-03	03034051193	05/11/93		SD		x			X	x	X	X	
NA-SD-04	03044051193	05/11/93		SD		x			x	x	X	X	
NA-SW-01	03023051193	05/11/93		SW		x	x				X		
NA-SW-01	03023051793	05/17/93		SW		x							X
NA-SW-02	03013051193	05/11/93		SW		x					X		
NA-SW-02	03013051793	05/17/93		SW		x							X
NK-SD-01	01014112291	11/23/91		SD	x				X	x	X	x	
NK-SD-01	01014060992	06/10/92		SD	x				X	x	X		
NK-SD-01	01014051393	05/13/93		SD		x				X	X	X	
NK-SD-01	1638979	07/17/97		SD		X					X		
NK-SD-02	01034051393	05/13/93		SD		x	x		X	x	X	x	
NK-SD-02	01044051393	05/13/93		SD		X	x		x	x	X	x	
NK-SD-03	01024051393	05/13/93		SD		x				x	X	X	
NK-SD-04	01014060393	06/03/93		SD		X	x			X			
NK-SD-05	01024060393	06/03/93		SD		x	x			x			
NK-SD-06	01034060393	06/03/93		SD		x	x			x			
NK-SD-06	01014070293-	07/02/93		SD									x
NK-SD-07	01044060393	06/03/93		SD		x	X			x			
NK-SD-07	01024070293-	07/02/93		SD									x
NK-SD-08	01054060393	06/03/93		SD		X	x			x			
NK-SD-09	01094070793	07/07/93		SD							X		
NK-SD-19	01104070793	07/07/93		SD							X		
NK-SW-01	01013112291	11/23/91		SW	x						X		X
NK-SW-01	01013060892	06/09/92		SW	x						X		X
NK-SW-01	01033051393	05/13/93		SW		x	x		x	x	X		X
NK-SW-01D	01043051393	05/13/93		SW		x	x		x	x	X		X
NK-SW-02	01023112291	11/23/91		SW	x						X		X
NK-SW-02	01023060892	06/09/92		SW	x						X		X
NK-SW-03	01033112191	11/22/91		SW	x						X		X
NK-SW-03	01033060892	06/09/92		SW	X						X		X

Notes: 1. Legend: X - Analysed; at least one analyte over the detection limit; x - Analysed, no analytes in group over the detection limit

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SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING AND ANALYSES

Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extraction	Miscellaneous
NK-SW-04	01043112291	11/23/91			SW	x						X		X
NK-SW-04	01043060892	06/09/92			SW	X						X		X
NK-SW-05	01053112291	11/23/91			SW	x						X		X
NK-SW-05	01053060892	06/09/92			SW	X						X		X
NK-SW-05	01023051393	05/13/93			SW		x					X		
NK-SW-06	01063112191	11/22/91			SW	x						X		X
NK-SW-06	01063060892	06/09/92			SW	X						X		X
NK-SW-06	01013051393	05/13/93			SW		x					X		
NK-SW-06	1638999	07/17/97			SW		x					X		
SA-SD-01	04014112291	11/23/91			SD	x				X	x	X	x	
SA-SD-01	04014060992	06/10/92			SD	X				x	x	X		
SA-SD-01	1638992	07/17/97			SD		X					X		
SA-SD-01	1638995	07/17/97			SD		x					X		
SA-SD-02	02034051193	05/11/93			SD		x			x	x	X	x	
SA-SD-02	1638994	07/17/97			SD		X					X		
SA-SD-03	02024051193	05/11/93			SD		x			x	x	X	x	
SA-SD-04	04034051293	05/12/93			SD		x			X	x	X	x	
SA-SD-04	1638989	07/17/97			SD		x					X		
SA-SD-05	04024051293	05/12/93			SD		x			X	x	X	X	
SA-SD-06	02014051193	05/11/93			SD		X			x	x	X	X	
SA-SD-06	1638993	07/17/97			SD		x					X		
SA-SD-07	04014051293	05/12/93			SD		x			X	x	X	x	
SA-SD-08	1638991	07/17/97			SD		X					X		
SA-SD-09	1638990	07/17/97			SD		X					X		
SA-SW-01	04013112191	11/22/91			SW	x						X		X
SA-SW-01	04013060892	06/09/92			SW	x						X		X
SA-SW-01	02033051193	05/11/93			SW		x					X		
SA-SW-01	1639014	07/17/97			SW		x					X		
SA-SW-02	04023112191	11/22/91			SW	x						X		X
SA-SW-02	04023060892	06/09/92			SW	x						X		X
SA-SW-02	1639012	07/17/97			SW		x					X		
SA-SW-03	04033112191	11/22/91			SW	x						X		X
SA-SW-03	04033060892	06/09/92			SW	x						X		X

Notes: 1. Legend: X - Analysed; at least one analyte over the detection limit; x - Analysed, no analytes in group over the detection limit

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SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING AND ANALYSES
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information					Analysis Information								
Location ID	Sample ID	Sample Date	From (ft) To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extraction	Miscellaneous
SA-SW-04	02023051193	05/11/93		SW		x					X		
SA-SW-05	04033051293	05/12/93		SW		x					X		
SA-SW-05	1639009	07/17/97		SW		x					x		
SA-SW-06	04023051293	05/12/93		SW		x					X		
SA-SW-07	02013051193	05/11/93		SW		x					X		
SA-SW-07	1639013	07/17/97		SW		x					X		
SA-SW-08	04013051293	05/12/93		SW		x					X		
SA-SW-08	1639015	07/17/97		SW		x					X		
SA-SW-09	1639011	07/17/97		SW		x					x		
SA-SW-10	1639010	07/17/97		SW		x					X		
SK-SD-01	02014112291	11/23/91		SD	X				x	X	X	x	
SK-SD-01	02014060992	06/10/92		SD	x				x	x	X		
SK-SD-01	02024051393	05/13/93		SD		X				X	X	X	
SK-SD-02	02024112291	11/23/91		SD	x				X	x	X	x	
SK-SD-02	02024060992	06/10/92		SD	X				x	x	X		
SK-SD-02	02014051293	05/12/93		SD		X			x	x	X	X	
SK-SD-02	1638988	07/17/97		SD		X					X		
SK-SD-03	02034051393	05/13/93		SD		X	x			x	X	x	
SK-SD-04	02014051393	05/13/93		SD		x				x	X		
SK-SD-04	02140051393	05/13/93		SD								x	
SK-SD-04	1638996	07/17/97		SD		X					X		
SK-SD-05	02024051293	05/12/93		SD		X	X		x	x	X	x	
SK-SD-06	02018052893	05/28/93		SD		X							
SK-SD-06	02015060793	06/07/93		SD		x					X		
SK-SD-07	1017529	08/21/96		SD		X	x			X	X		
SK-SD-07	1638984	07/17/97		SD		X				X	X		
SK-SD-07	1638985	07/17/97		SD		X				x	X		
SK-SD-08	1017528	08/21/96		SD		X	x			x	X		
SK-SD-08	1638983	07/17/97		SD		X					X		
SK-SD-09	1017527	08/21/96		SD		X	x			x	X		
SK-SD-09	1638982	07/17/97		SD		X					X		
SK-SD-10	1017526	08/21/96		SD		X	x			x	X		
SK-SD-10	1638981	07/17/97		SD		X					X		

Notes: 1. Legend: X - Analysed; at least one analyte over the detection limit; x - Analysed, no analytes in group over the detection limit

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SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING AND ANALYSES
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information					Analysis Information								
Location ID	Sample ID	Sample Date	From (ft) To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extraction	Miscellaneous
SK-SD-11	1017525	08/21/96		SD		X	x			x	X		
SK-SD-11	1638980	07/17/97		SD		X					X		
SK-SD-12	1017531	08/21/96		SD		X	x			x	X		
SK-SD-12	1017543	08/21/96		SD		x	x			x	X		
SK-SD-13	1017530	08/21/96		SD		x	x			x	X		
SK-SD-14	1017532	08/21/96		SD		x	x			x	X		
SK-SD-15	1017533	08/21/96		SD		x	x			x	X		
SK-SD-16	1638986	07/17/97		SD		X					X		
SK-SD-17	1638987	07/17/97		SD		X					X		
SK-SW-01	02013112191	11/22/91		SW	x						X		X
SK-SW-01	02013060892	06/09/92		SW	x						X		X
SK-SW-02	02023112191	11/22/91		SW	X						X		X
SK-SW-02	02023060892	06/09/92		SW	X						X		X
SK-SW-02	02023051393	05/13/93		SW		X					X		
SK-SW-03	02033112191	11/22/91		SW	X						X		X
SK-SW-03	02033060892	06/09/92		SW	X						X		X
SK-SW-03	02013051293	05/12/93		SW		X					X		
SK-SW-03	1639008	07/17/97		SW		X					X		
SK-SW-04	02043112291	11/22/91		SW	x						X		X
SK-SW-04	02043060892	06/09/92		SW	x						X		X
SK-SW-04	02013051393	05/13/93		SW		x					X		
SK-SW-04	1639016	07/17/97		SW		x					x		
SK-SW-05	02033051393	05/13/93		SW		X	x				X		
SK-SW-06	02023051293	05/12/93		SW		x	x				X		
SK-SW-07	1017538	08/21/96		SW		X	x			x	X		
SK-SW-07	1018912	10/07/96		SW		X							
SK-SW-07	1639004	07/17/97		SW		X					X		
SK-SW-07	1639005	07/17/97		SW		X					X		
SK-SW-08	1017537	08/21/96		SW		X	x			x	X		
SK-SW-08	1018911	10/07/96		SW		X							
SK-SW-08	1639003	07/17/97		SW		X					X		
SK-SW-09	1017536	08/21/96		SW		X	x			x	X		
SK-SW-09	1018910	10/07/96		SW		X							

Notes: 1. Legend: X - Analysed; at least one analyte over the detection limit; x - Analysed, no analytes in group over the detection limit
2. Printed on 05/26/98

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Table 3

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SUMMARY OF SURFACE WATER AND SEDIMENT SAMPLING AND ANALYSES
Airport/Klondike Area, Pratt & Whitney, East Hartford, Connecticut

Sample Information						Analysis Information								
Location ID	Sample ID	Sample Date	From (ft)	To (ft)	Class	Portable GC	Volatile Organics	Semivolatile Organics	Herbicides	Pesticides	PCBs	Metals	Extraction	Miscellaneous
SK-SW-09	1639002	07/17/97			SW		X					x		
SK-SW-10	1017535	08/21/96			SW		X	x			x	X		
SK-SW-10	1018909	10/07/96			SW		X							
SK-SW-10	1639001	07/17/97			SW		X					X		
SK-SW-11	1017534	08/21/96			SW		X	x			x	X		
SK-SW-11	1018908	10/07/96			SW		X							
SK-SW-11	1639000	07/17/97			SW		X					X		
SK-SW-12	1632998	07/18/97			SW		x	X						X
SK-SW-12	1632999	07/18/97			SW		x	x						X
SK-SW-13	1633000	07/18/97			SW		x	X						X
SK-SW-14	1633001	07/18/97			SW		x	x						X
SK-SW-16	1639006	07/17/97			SW		X					X		
SK-SW-17	1639007	07/17/97			SW		X					x		

Notes: 1. Legend: X - Analysed; at least one analyte over the detection limit; x - Analysed, no analytes in group over the detection limit
2. Printed on 05/26/98

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